OPERATING INSTRUCTIONS

Corrosion Testing System

S 400 M-SC
Type No. 4401 6101

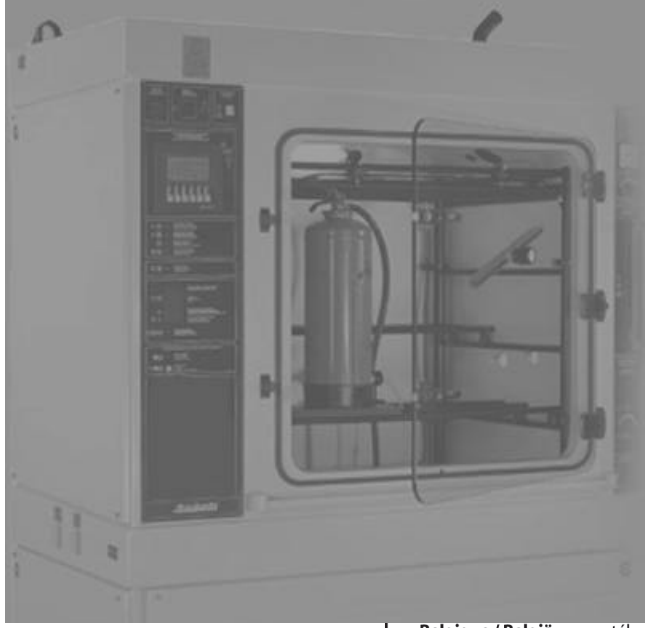
S 1000 M-SC
Type No. 4501 7101

S 2000 M-SC
Type No. 4601 7101

Liebisch® LABORTECHNIK

im Zeichen der Zukunft

FN:



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Conformitation

Gebr. Liebisch GmbH & Co. KG declares under sole responsibility that the testing unit S 1000 M-SC (FN-No xxxxxx) is in conformity with the Council Directives on the approximation of the laws of the EEC member states relating to:

- Electromagnetic compatibility 89/336/EWG
- Electrical equipment designed for use within certain voltage limits 2006/95/EG
- Pressure equipment directive 97/23/EG

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General Remarks

This series of corrosion diagnostic instruments was specifically developed for saline mist test according to DIN EN ISO 9227 or ASTM B117.

Instrument type	Standard
S 400 M-SC	DIN EN ISO 9227 (formerly DIN 50021), ASTM B117
S 1000 M-SC	DIN EN ISO 9227 (formerly DIN 50021), ASTM B117
S 2000 M-SC	DIN EN ISO 9227 (formerly DIN 50021), ASTM B117

Table 1: Examples for corresponding standards

For details please check the corresponding standards.

Please study these Operating Instructions carefully before setting up and operating the instrument!

Knowledge of the relevant chapters of these Operating Instructions is an imperative precondition for the operator to ensure the safe operation of the corrosion diagnostic instrument in keeping with its intended purpose.

Operators are duty bound to familiarise themselves with the safety instructions and operating conditions in order to avoid injury and damage.

All liability and guarantee claims become null and void if the instrument is damaged as a result of incorrect operation and/or if it was not used in keeping with its intended purpose.

All maintenance and repairs must be completed by personnel of Gebr. Liebisch GmbH & Co. KG or specialists authorised by Liebisch.

This information is based on our current standards of knowledge.

The operator is responsible for the observation of the pertinent statutory rules and regulations.

The illustrated instruments and details may be equipped with optional accessories.

Subject to technical alterations.

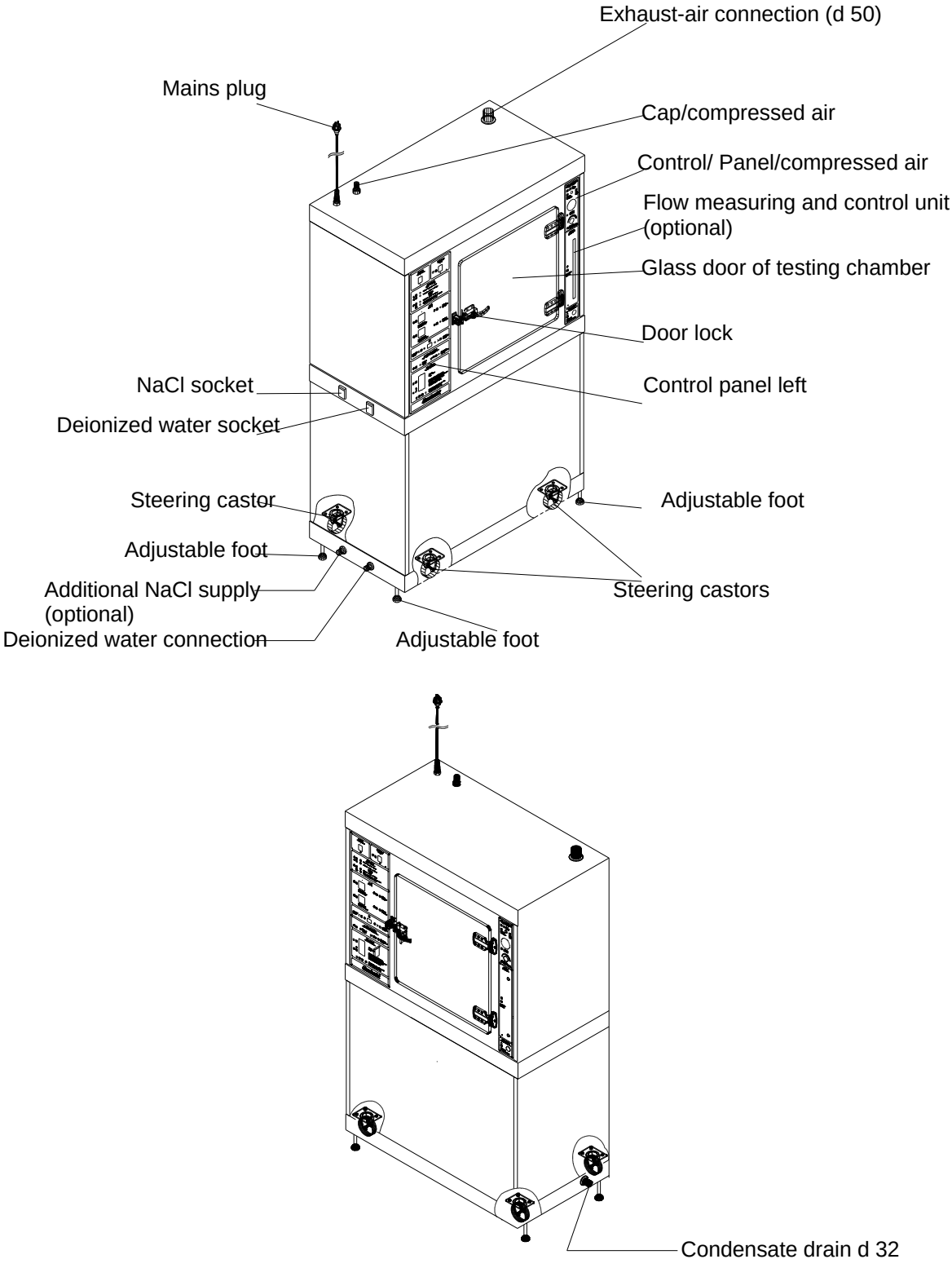


Fig. 1: General view of S 400 M-SC/ S1000 M-SC

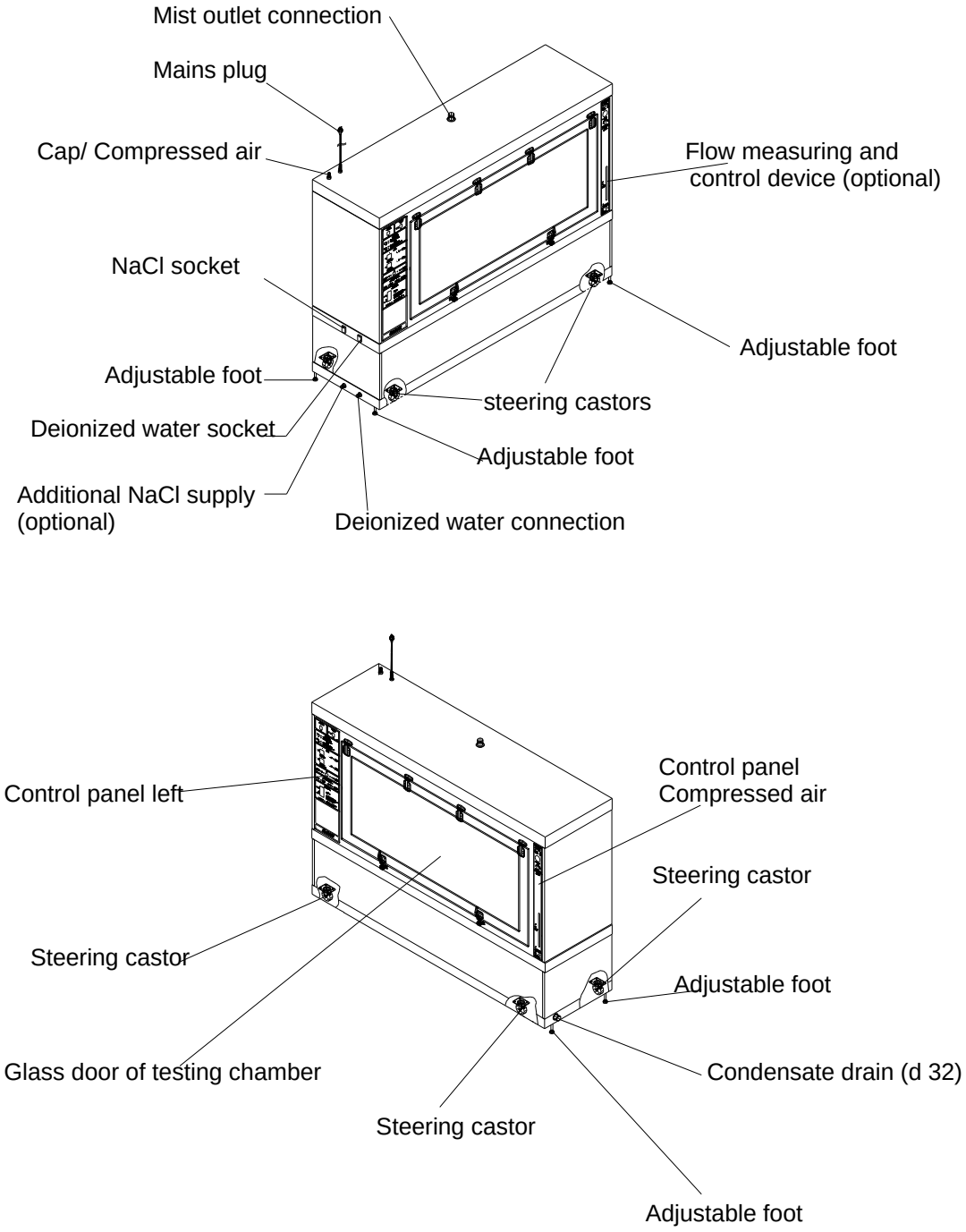


Fig. 2: General view of S 2000 M-SC

1 SAFETY

1.1 Safety instructions and advice

The following symbols are used in these Operating Instructions:

DANGER! Indicates an imminent hazard. Non-observation of the warning can result in death or severe injury!

IMPORTANT! Draws attention to important operating and application instructions and other useful information.

1.2 Instrument safety

The instruments feature electrical and mechanical safety devices. They were subjected to a strict safety and acceptance test.
Incorrect operation or use can

- threaten life and limb of the operator,
- damage the instrument and the operator's property, and
- diminish the instrument's operating efficiency.

All persons concerned with the installation, commissioning, operation, maintenance and repair of the instrument must be

- correspondingly qualified, and
- be familiar with these Operating Instructions.

Human safety is at stake!

1.3 Use as prescribed

The instruments are intended exclusively for the performance of saline mist tests (e.g. DIN EN ISO 9227, ASTM B 117). The instruments were specifically developed for this purpose and must not be operated in a manner in which they were not intended to be used!

Never drop heavy test specimens in the testing chamber as this can damage the base plate.

Do not allow the test specimens to knock against the inside walls of the instrument as this can damage the walls.
Unauthorised instrument conversions and changes are prohibited for safety reasons.

IMPORTANT!
The operating, maintenance and repair conditions prescribed in these Operating Instructions must be strictly observed.

1.4 Hazards resulting from the accessories

Peripheral units must not nullify the safety devices of the test instrument.

1.5 Approved operators

- Only experts or instructed persons are allowed to operate these instruments.
- The minimum age of operators is 18.
- The operator is responsible for third parties within the working area.
- The areas of responsibility for the different activities in connection with the instrument must be clearly defined and observed. Ambiguous areas of competence are a safety risk!

The owner must
- Make these Operating Instructions accessible to the operator;
- Check that operators have read and understood these Operating Instructions.

1.6 Safety measures at the point of installation

Install the test instrument in its own room. Any saline mist that may be emitted as a result of incorrect operation can result in corrosion damage in the area around the instrument.

The installation room must have a drain in the floor near the instrument.
To ensure complete stability, the instrument must be set up on a level and firm base. An instrument that topples over is hazardous to life!

IMPORTANT!
Corresponding in-house instructions and checks must ensure that the area around the workplace is always clear and uncluttered.

1.7 Protective equipment

The instruments are fitted with the following safety devices:

- Lockable test room door
- Electromechanical overtemperature protection for the test room
- Electromechanical overtemperature protection for the humidifier
- Mechanical overpressure valve for the humidifier
- Mechanical overpressure valve in the compressed-air line
- Main switch with thermal overcurrent protection

The safety devices:

- Have been installed for the safety of the operating personnel and to protect the surrounding area.
- Must, under no circumstances, be changed or removed, nor must they be bypassed as a result of changes to the instrument.

Consult the Maintenance Plan in the Care and Maintenance chapter to check the safety devices.

IMPORTANT!
Attention is drawn to the possible existence of additional statutory requirements of national institutions responsible for the health and safety of the operating personnel.

1.8 Conduct in the event of an emergency

In an emergency immediately turn the main switch to the O setting and disconnect the mains plug.

2 Transport/ Installation

2.1 Technical data

Instrument type	S 400 M-SC	S 1000 M-SC	S 2000 M-SC
Article number	4401 6101	4501 7101	4601 7101
Weight	appr. 380 kg	appr. 400 kg	appr. 750 kg
Cabinet dimensions outside (w x d x h) [mm]	1550 x 860 x 2100	1780 x 1080 x 2140	2920 x 1150 x 2190
Inside dimensions test room (w x d x h) [mm]	705 x 720 x 730	950 x 850 x 1065 (1350)	2100 x 810 x 1060 (1300)
Door opening (w x d x h) [mm]	680 x 550	887 x 875	1995 x 875
Max. loading test room	60 kg	120 kg	240 kg
Number and loading of sample holders	12 pc. à 5 kg	12 pc. à 10 kg	24 pc. à 10 kg
Volume test room [litre]	appr. 400	appr. 1.000	appr. 2.000
Operating voltage	AC 230 V +6/-10%	AC 400 V +6/-10%	AC 400 V +6/-10%
Connected load SAL	2600 W	3400 W	4400 W
Control range test room SAL	up to 50°C	up to 50°C	up to 50°C
Control range humidifier SAL	up to 70°C	up to 70°C	up to 70°C
Frequency	50/60 Hz	50/60 Hz	50/60 Hz
Fuse in main switch	12 A	8 A	12 A
Temperature control	el. PID	el. PID	el. PID
Interface temp. controller	option	option	option
Overtemperature protection for test room	yes	yes	yes
Overtemperature protection for humidifier	yes	yes	yes
Operating resources			
Pressure demin. water	2,5-3,0 bar	2,5-3,0 bar	2,5-3,0 bar
Water quality	conf. to standard	conf. to standard	conf. to standard
Supply test solution	100 litre	100 litre	300 litre
Consumption demin. water humidifier	appr. 0,4-0,8 litre	appr. 0,4-0,8 litre	appr. 1-1,4 litre
Consumption demin. water humidifier.	appr. 80-120 ml/hr	appr. 80-120 ml/hr	appr. 80-120 ml/hr
Consumption compr. air / hr.	appr. 2,5 m^3/hr	appr. 2,5 m^3/hr	appr. 2,5 m^3/hr
Compressed air connection	3-4 bar	3-4 bar	3-4 bar
Disposal			
Exhaust -air hose	d50 mm (hose)	d50 mm (hose)	d75 mm (hose)
Condensate draining hose	d32 mm (hose)	d63 mm (hose)	d63 mm (hose)

Table 2: Technical data

2.2 Transport/Storage

The corrosion diagnostic instrument is delivered in a transport crate of corresponding size.
If the instrument is to be transported with a fork-lift truck, then the fork must carry the instrument on at least two opposing points of the instrument base. The fork of the truck must at least 1000 mm long.

The following points must be observed for the storage/transportation of the instrument:

- Use a dry room for temporary instrument storage.
- Use an adequately strong packaging/transport container for dispatch.
- Prior to dispatch clean the instrument to remove all harmful substances and residues.

2.3 Installing and connecting the instrument

2.3.1 Demands expected of the installation room

- The instrument must be placed and practiced at room temperature (ambient temperature +18°C to +28°C) in a room without corrosive atmosphere.
- There must be a drain in the floor of the installation room. Take information about the diameter of the tap water hose from table 2, page 8.
- There must be a clean atmosphere in the installation room.
- The instrument must be protected from wide and rapid temperature fluctuations, direct exposure to the sun and draughts. This could influence the instrument's temperature control systems.
- The instrument should be set up in its own room that can be permanently ventilated.
- The instrument's compressed-air humidifier must be continuously supplied with demineralized water. The instrument is fitted with a connection for demineralized water.

- The necessary pressure for the alimentation for the humidifier system is approx. 2.5-3.0 bar (pressure of water).
- The exhaust-air hose (maximum length 5 m) must be conducted free of counter-pressure to the outside or to the vicinity of a suitable extractor. Technical details must be explained individual for each customer, it isn't possible to inform about it generally.
  Take information about the diameter of the exhaust-air hose from table 2, page 8.
  WARNING! The exhaust air of the instrument can promote corrosion.

2.3.2 Installing and levelling the diagnostic instrument

IMPORTANT!
The diagnostic instrument must be installed absolutely level to ensure proper performance.
Position the instrument at its point of installation. Use a spirit level for this purpose, and observe the reference points indicated in fig. 3 and fig. 4 .

IMPORTANT!
Tooling requirements have resulted in instrument housing conicity so that only the indicated reference points (side and front) (see fig. 3/4) must be used for levelling.

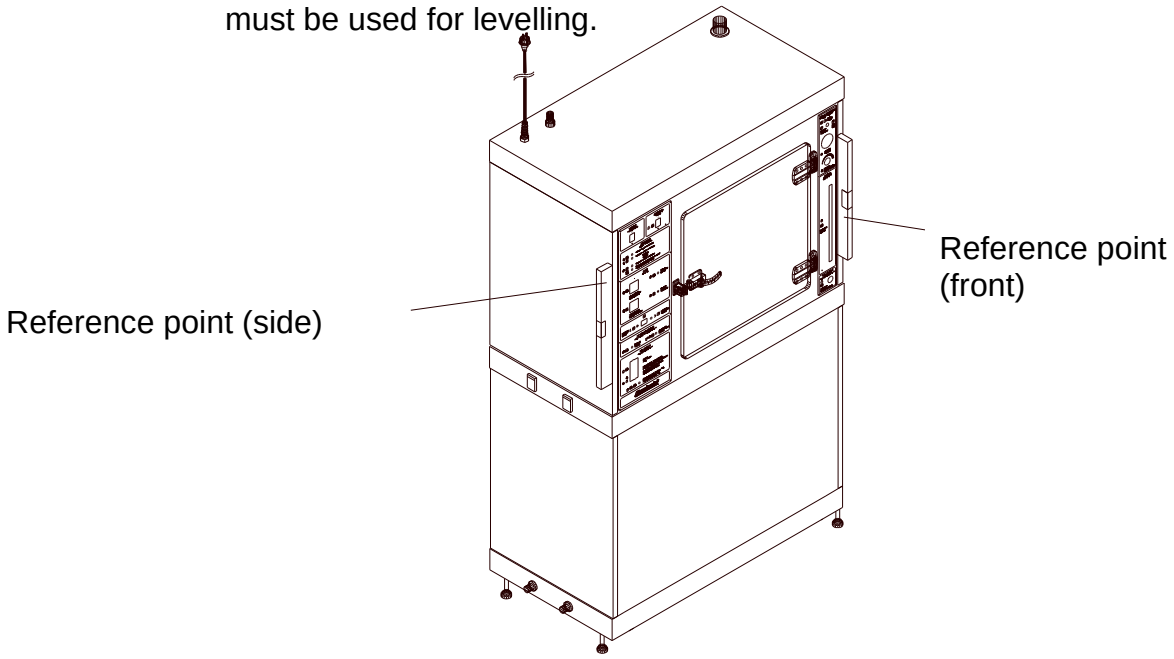


Fig. 3: Reference points for the spirit level 400/1000 M-SC

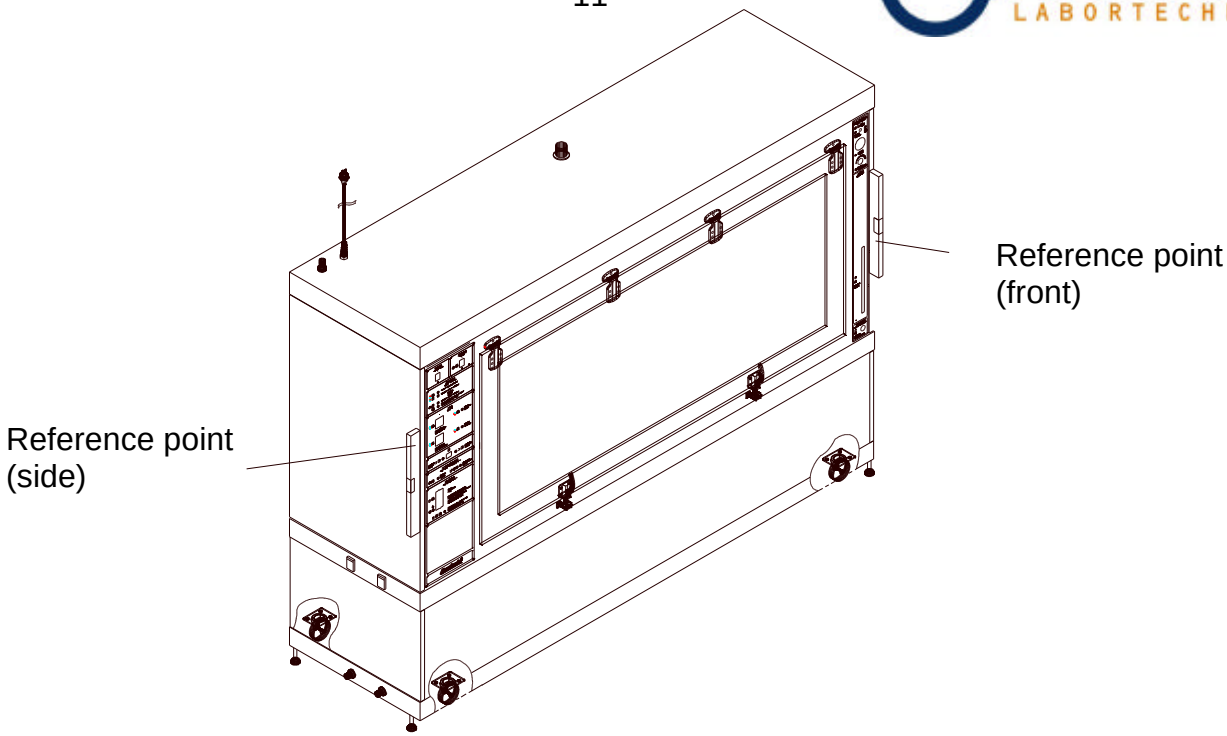


Fig. 4: Reference points for the spirit level 2000 M-SC

Adjust the feet as follows:
Use a suitable screwdriver, push it through the bore hole and turn the threaded pin to the left or right (see fig. 5).
Carefully level the instrument.

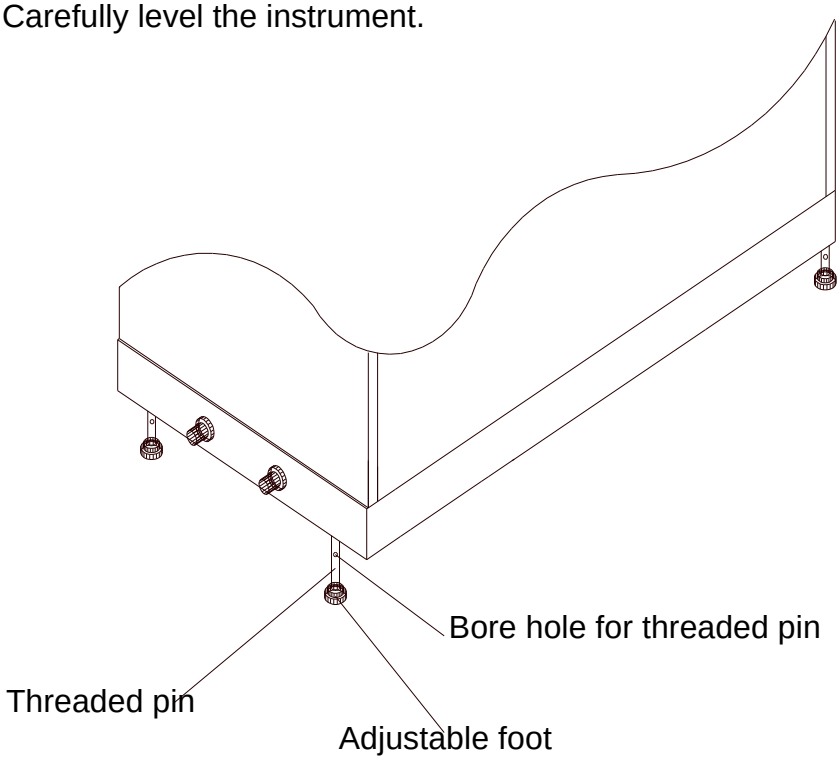


Fig. 5 Adjustable foot

Establish the connection with the compressed-air supply. The compressed-air line installed by the customer is linked with the instrument's plug-in connection for compressed air (fig. 1/2, page 3/4).
Compressed-air requirements: min. 3.0 bar; max. 4.0 bar
Use only oil- and water-free compressed air! You can get a compressed air cleaning device as an option.

Install the exhaust-air hose and conduct it in such a manner that it is free of counter-pressure. The liquid subsequently precipitating in this hose must be able to flow back freely.
It is essential to prevent points of water accumulation and hose loops!

Install the condensate draining hose and conduct it in such a manner that it is free of counter-pressure.
It is essential to prevent points of water accumulation and hose loops!

2.3.3 Electrical safety

Set up the instrument in the vicinity of an electrical connection. The instrument must only be electrically connected by a qualified electrician.
The instrument's operating voltage must conform with the mains voltage.
For maximum electrical safety it is advisable to install a residual current protection circuit with a tripping current of 30 mA.
Establish the electrical connection, but do NOT switch on the instrument. First read the entire Operating Instructions!

3 Operation

Have these Operating Instructions, particularly Chapter 1, been read and clearly understood?

The instrument must not be operated beforehand!

3.1 Key to the control panel (left side)

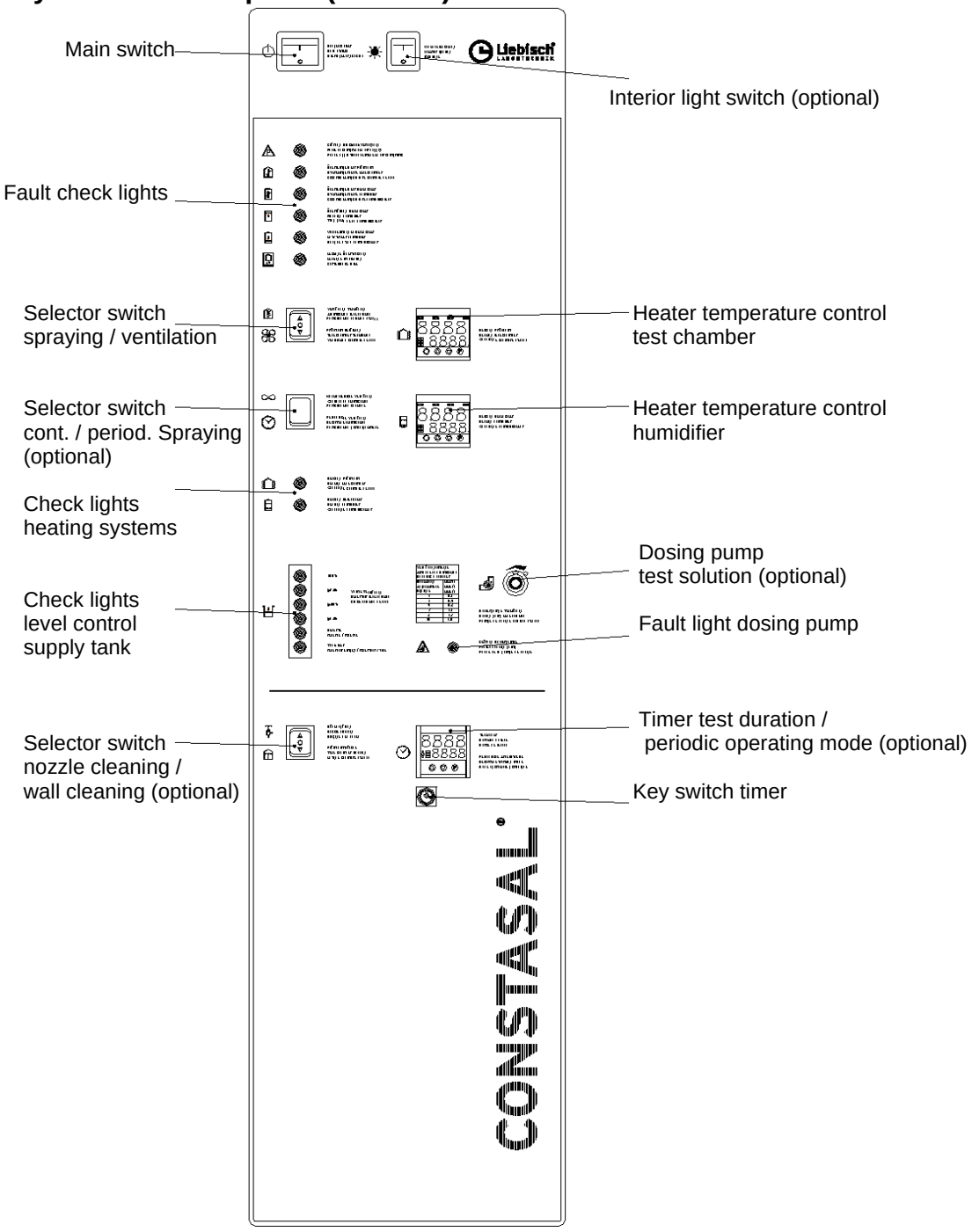

Main switch
Interior light switch (optional)
Fault check lights
Selector switch spraying / ventilation
Heater temperature control test chamber
Selector switch cont. / period. Spraying (optional)
Heater temperature control humidifier
Check lights heating systems
Dosing pump test solution (optional)
Check lights level control supply tank
Fault light dosing pump
Timer test duration / periodic operating mode (optional)
Selector switch nozzle cleaning / wall cleaning (optional)
Key switch timer
CONSTASAL

Fig. 6: Control panel (left-hand side)

3.2 Key to the control panel elements (right-hand side)

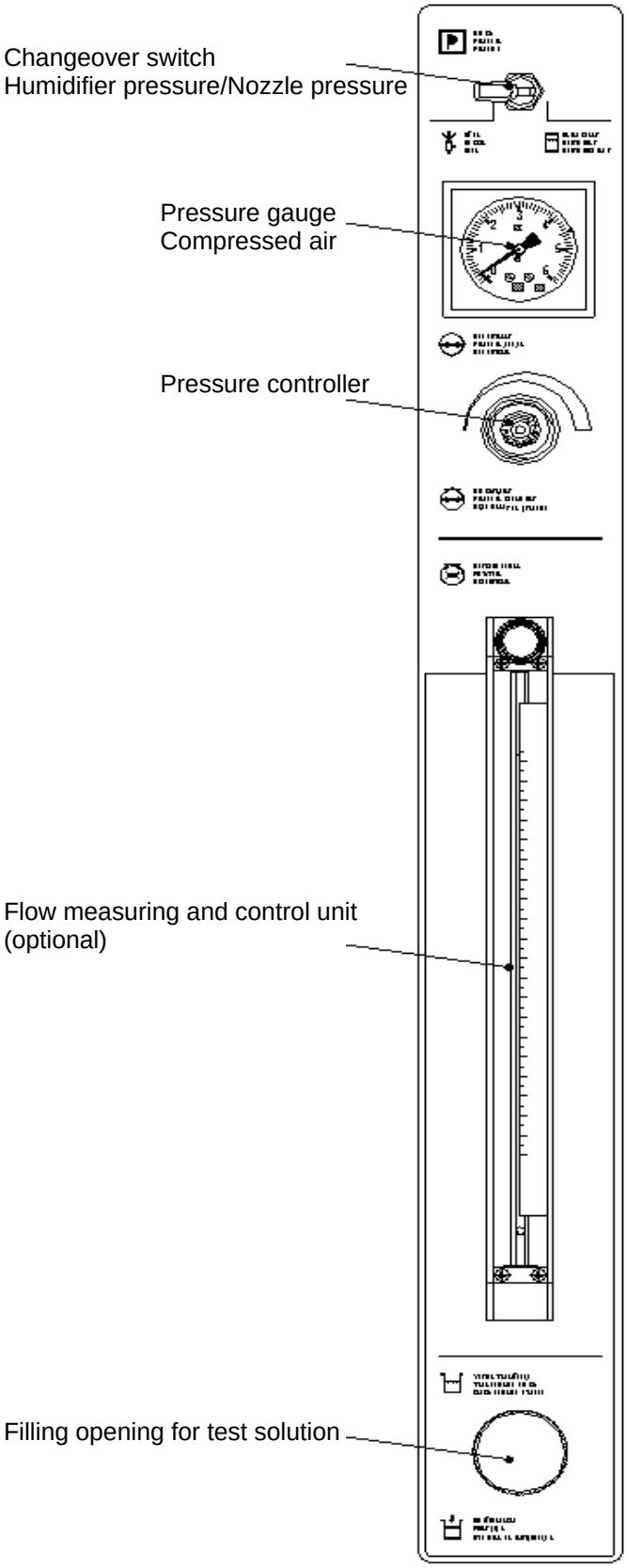


Fig. 7: Control panel (right-hand side)

3.3 Test preparations

3.3.1 General test preparations

- Open the testing chamber door.
- Place the part that is to be tested in the testing chamber.

IMPORTANT! Do not place the test specimen on the floor of the testing chamber.

- Lock the testing chamber door.
- Fill the NaCl supply tank with NaCl test solution (e.g. acc. to DIN EN ISO 9227).
- Use the drum pump supplied with the instrument.
- Open the filling opening for the test solution on the right-hand control panel and connect the filling hose of the pump to the filling connection.
- Fill the depot completely and observe the filling-level indicator for the depot test solution on the left-hand control panel.
- Remove the pump and close the connection.

4 Testing methods

4.1 Saline mist with continuous atomization (e.g. DIN EN ISO 9227)

- Switch on the testing cabinet by actuating the main switch (fig. 6). The green pilot light integrated in the main switch lights up. The temperature controllers become activated and complete a self-test.

- Setting the temperature controller:
  Termination of the self-test is followed by the presentation of the standard display of the normal operating mode.
  The temperature controller for Heating/Testing chamber SAL controls the temperature prevailing in the testing chamber during the saline mist testing process.
  The temperature controller for Heating/Humidifier controls the compressed-air humidifier temperature during the saline mist testing process.

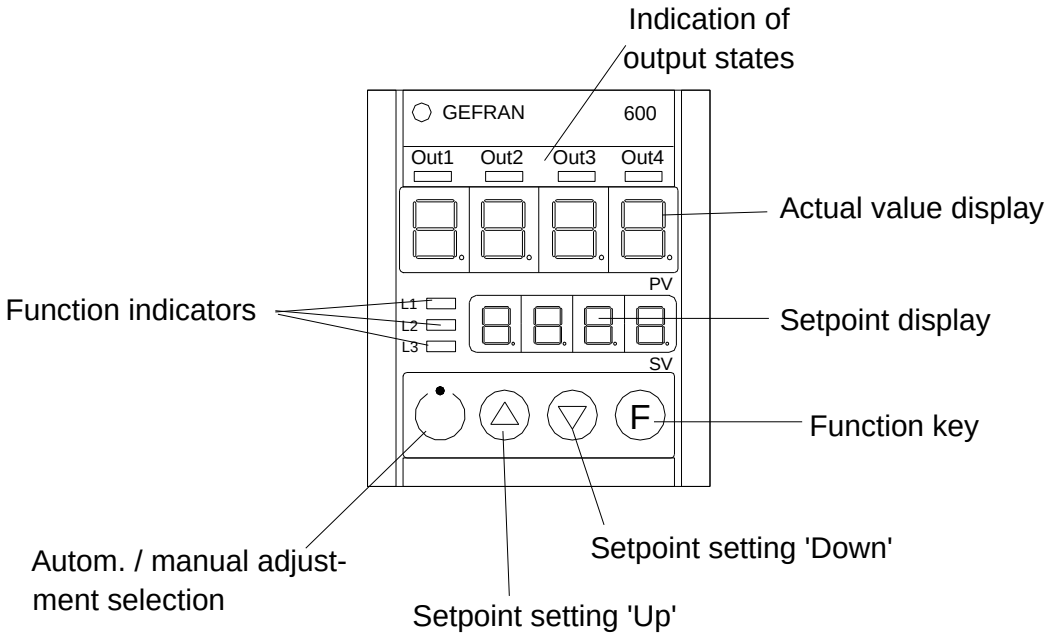


Fig. 8: Controller

Important! The temperature controller has been configured and parameterised by the manufacturer.
Use of the functional key is not necessary for operation.
Only use the UP and DOWN arrow keys for setpoint entry for the controller.
Important! Do not actuate the UP and DOWN keys simultaneously.

Increase the setpoint (arrow key 'UP').

Diminish the setpoint (arrow key 'DOWN').

The testing cabinet is usually operated at a chamber temperature of 35°C/50°C (e.g. DIN EN ISO 9227 /ASTM B117).

Setpoint entry of the testing chamber temperature control is limited to maximum 50°C and minimum 0°C. Setpoint entry of the compressed-air humidifier temperature control is limited to maximum 80°C and minimum 0°C.

The temperature controller features a PID system. His system-conditional control behaviour guarantees accurate control of the testing chamber temperature and prevents excessive overshoot of the testing

chamber temperature during the heating-up phase. The set testing chamber temperature is reached after approximately 1 hour.

- Set the atomizing changeover switch 'Continuous/Ventilation' to the 'Continuous' position.
- Set the changeover switch 'Periodic/Continuous Operating Mode' to the 'Continuous' position (optional equipment).
- Set the selector switch 'Pressure' (fig. 7) to the 'Nozzle' position (e.g. acc. table of DIN EN ISO 9227 standard).
- Recommended mean value: approx 1 bar.
- Return the selector switch 'Pressure' to the 'humidifier' position. The pressure gauge now indicates the humidifier input pressure. The air distributor in the compressed-air humidifier tank must be changed (after approx. 5,000 operating hours) when the pressure difference between the switch positions 'Humidifier' and 'Nozzle' rises to values 1 bar.
- Set the atomizing volume per hour on the control valve of the flow measuring and control module.

Spraying process:

The testing cabinet is equipped with a self-priming 2-substance nozzle operating according to the injection principle.

The test solution is sucked in through the hose that is connected with the nozzle. The compressed air and test solution expand as they are emitted by the nozzle cap.

The capacity and efficacy of the nozzle, and the characteristics of the spraying cone, can be influenced by adjusting the nozzle cap accordingly.

The suction action is regulated and the required liquid-air mixture adjusted, by this measure and by setting the air pressure and flow rate (observe the needle valve of the flow measuring and controlling module). Increasing the pressure raises the atomizer capacity and the fineness of atomization.

Flow measuring and control unit (optional):

This accessory module consists of a flow meter operating according to the float principle in combination with a needle dosing valve.

Spraying solution consumption can be optimally regulated, dosed and controlled with the help of this module is integrated in the suction line for spraying solution and located on the right panel of the testing cabinet.
With testing cabinets featuring this special facility, nozzle efficacy is adjusted only once and then checked for optimal performance.
Additional or diminished spraying solution consumption then only has to be controlled by actuating the needle valve.
Additional or diminished consumption can also be controlled by varying the air pressure.

Setting the nozzle (with flow measuring and control module):
The nozzle will be adjusted during continuous atomization.
Adjust the "changeover switch humidifier pressure/nozzle pressure" into the position nozzle.

a) Actuate the pressure controller and set the air pressure to approx. 1.0 bar (nozzle advance pressure).
b) Open the needle valve of the flow measuring and control module.
c) Release the locking ring of the nozzle by turning it anti-clockwise.
d) Turn the nozzle cap to the left or right and observe the flow measuring and control module.
e) The measure specified in c) has an immediate effect on the behaviour of the float.
f) A rising tendency of the float indicates that the optimal flow rate is being approached.
g) Turn the locking ring clockwise to fix the nozzle cap as soon as the highest flow rate is indicated.
h) Set a flow rate of approx. 500 ml/h (test chamber volume 400l) on the needle valve. For a test chamber volume of 1000l the value should be approx. 500-700ml/h, and at 2000 litre chambers approx. 800-1000ml/h.

To get the same results referring the volume of accumulated test solution the volume of sprayed test solution must increase by using larger test chambers.
Indication: Request individual information to adjust the nozzle without flow measuring and control module.

Test interruption/Shutting down:

Turn the selector switch ‘atomization/ventilation' to the 'ventilation' position before interrupting the test or before the end of the test. Compressed air now blows out the remaining mist in the chamber via the mist output line (takes approx. 10 minutes).

Return the selector switch ‘atomization/ventilation' to 0. The you can open the door.

4.2 Salt mist tests with periodic atomization (e.g. DIN 50907) (optional feature)

- Switch on the testing cabinet by actuating the main switch (fig. 6). The green pilot lamp integrated in the main switch lights up. This activates the temperature controllers which perform a self-test.

Setting the temperature controller:

- Termination of the self-test is followed by the presentation of the
- standard display of the normal operating mode.
- The temperature controller for Heating/Testing chamber SAL controls the temperature prevailing in the testing chamber during the saline mist testing process e.g. acc. to DIN 50907.
- The temperature controller for Heating/Humidifier is not required.

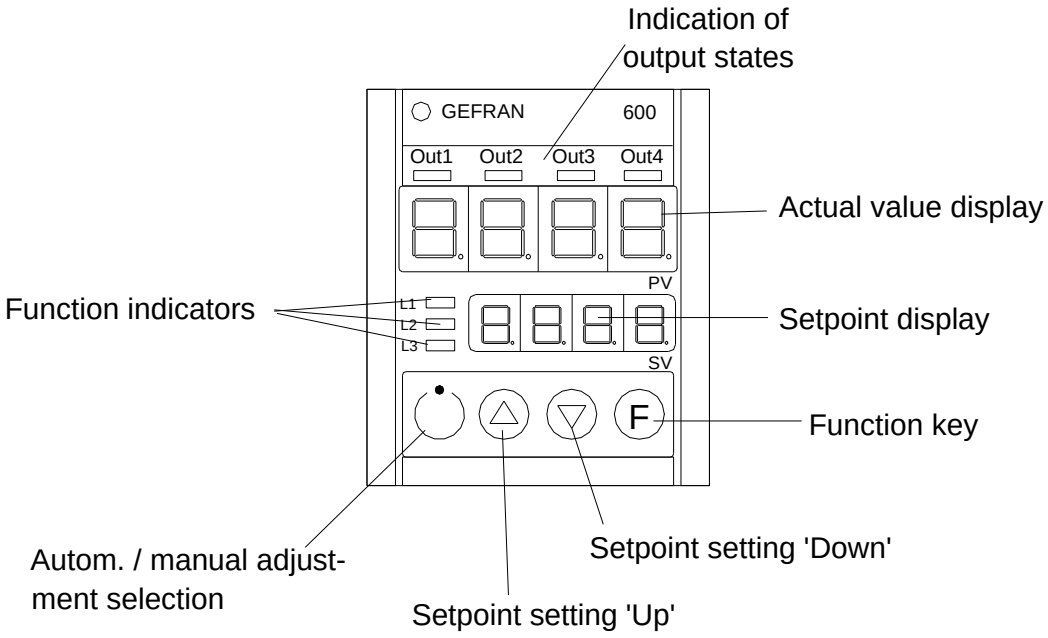


Fig. 9: Controller

Important! The temperature controller has been configured and parameterised by the manufacturer.
Use of the functional key is not necessary for operation.
Only use the UP and DOWN arrow keys for setpoint entry for the controller.
Important! Do not actuate the UP and DOWN keys simultaneously.

Increase the setpoint (arrow key 'UP').

Diminish the setpoint (arrow key 'DOWN').

The testing cabinet is usually operated at a chamber temperature of 35°C / 50°C (e.g. DIN 50907).

Setpoint entry of the test compartment temperature control is limited to maximum 50°C and minimum 0°C.

The temperature controller features a PID system.
This system-conditional control behaviour guarantees accurate control of the testing chamber temperature and prevents excessive overshoot of the testing chamber temperature during the heating-up phase. The set testing chamber temperature is reached after approximately 1 hour.

- Set the atomizing changeover switch 'atomization/ventilation' to the 'atomization' position.
- Set the changeover switch 'continuous/periodic' Operating Mode to the 'periodic' position.
- The periodic operating mode timer (see fig.10) is activated and performs a brief self-test. The timer features 2 programmable outputs:

  Output 1 = atomizing
  Output 2 = pause (no atomizing)

  Display output 1 = No flashing dot behind the last display digit of the display.
  Display output 2 = Flashing dot behind the last display digit of the display.

The times are set with the arrow keys, e.g.:

Output 1 = 5 min. atomizing
Output 2 = 55 min. pause

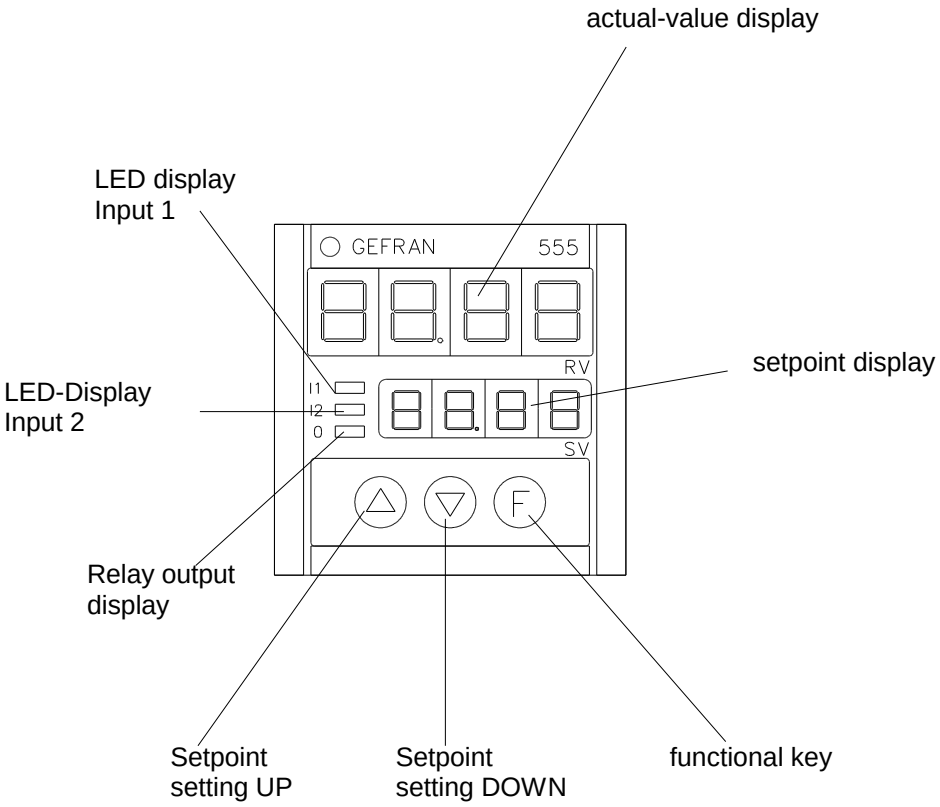


Fig. 10: Timer for periodic operation (optional)

Set the selector switch 'Pressure' (fig. 7) to the 'Humidifier' position (e.g. acc. table of DIN EN ISO 9227 standard).
Recommended mean value: approx. 1 bar.

Set the atomizer volume per hour on the control valve of the flow measuring and controlling module.

Spraying process:
The testing cabinet is equipped with a self-priming 2-substance nozzle operating according to the injection principle.
The test solution is sucked in through the hose that is connected with the nozzle. The compressed air and test solution expand as they are emitted by the nozzle cap.

The capacity and efficacy of the nozzle, and the characteristics of the spraying cone, can be influenced by adjusting the nozzle cap accordingly.
The suction action is regulated and the required liquid-air mixture adjusted, by this measure and by setting the air pressure and flow rate (observe the needle valve of the flow measuring and control unit). Increasing the pressure raises the atomizer capacity and the fineness of atomization.

Flow measuring and controlling module (optional):
This accessory module consists of a flow meter operating according to the float principle in combination with a needle dosing valve.
Spraying solution consumption can be optimally regulated, dosed and controlled with the help of this module is integrated in the suction line for spraying solution and located on the right panel of the testing cabinet.
With testing cabinets featuring this special facility, nozzle efficacy is adjusted only once and then checked for optimal performance.
Additional or diminished spraying solution consumption then only has to be controlled by actuating the needle valve.
Additional or diminished consumption can also be controlled by varying the air pressure.

Setting the nozzle (with flow measuring and control module):
The nozzle will be adjusted during continuous atomization.
Adjust the "changeover switch humidifier pressure/nozzle pressure" into the position nozzle.

a) Actuate the pressure controller and set the air pressure to approx. 1.0 bar (nozzle advance pressure).
b) Open the needle valve of the flow measuring and control module.
c) Release the locking ring of the nozzle by turning it anticlockwise.
d) Turn the nozzle cap to the left or right and observe the flow measuring and control module.
e) The measure specified in c) has an immediate effect on the behaviour of the float.

f) A rising tendency of the float indicates that the optimal flow rate is being approached.

g) Turn the locking ring clockwise to fix the nozzle cap as soon as the highest flow rate is indicated.

h) Set a flow rate of approx. 500 ml/h (test chamber volume 400l) on the needle valve. For a test chamber volume of 1000l the value should be approx. 500-700ml/h, and at 2000 litre chambers approx. 800-1000ml/h.

To get the same results referring the volume of accumulated test solution the volume of sprayed test solution must increase by using larger test chambers.

Indication: Request individual information to adjust the nozzle without flow measuring and control module.

Test interruption/Shutting down:

Turn the selector switch 'atomization/ventilation' to the 'ventilation' position before interrupting the test or before the end of the test. Compressed air will then blow out the remaining mist in the chamber via the mist output line (takes approx. 10 minutes).

Return the selector switch 'atomization/ventilation' to 0. Then you can open the door

4.3 Testing cabinet with cycle counter/test duration (optional)

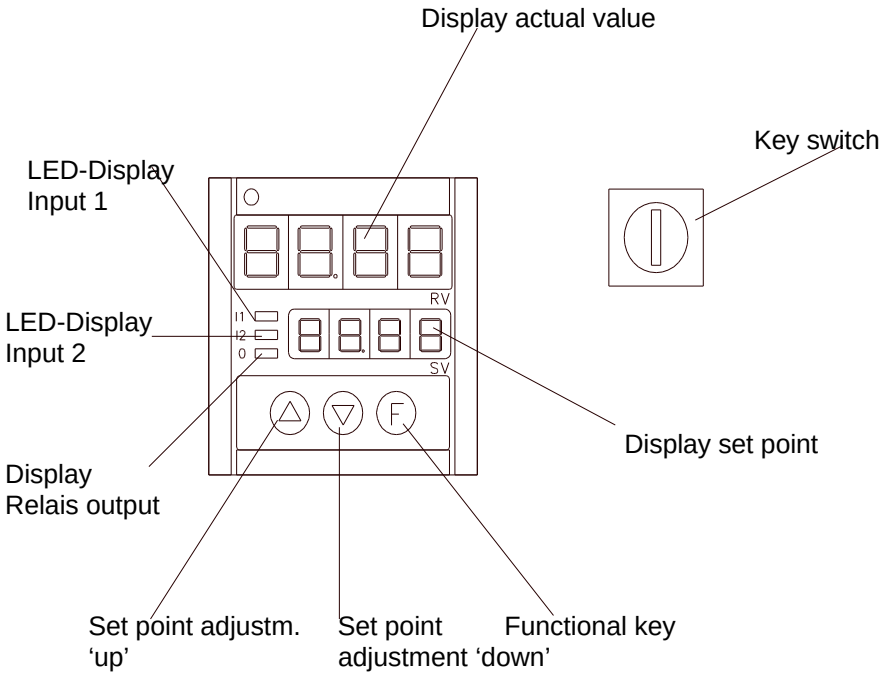


Fig. 11: Cycle counter/Test duration (optional)

Operation of the cycle counter:

- After switching on the system the cycle counter is activated and performs a self-test. The LED displays ‘Input 1’ and ‘Input 2’ light up. The ‘Relay output’ display is not active.
- Select the test duration [h] and [min] by actuating the buttons 'Up' / 'Down'.
- Start the counter by turning the key to the right at 90°.
- The selected time elapses now. The displays ‘Input 2’ and ‘Relay output’ are out.
- The remaining time is displayed at ‘Display actual value’.
- When the selected time is remained (Countdown function), the actual value display is 0 and the green LED display ‘Relay output’ is activated.

Reset / new start:

Turn the key switch to vertical position and repeat the start procedure.

5 Care and maintenance

5.1 Maintenance plan

What?	When?	Who?
Clean the testing chamber	Monthly	Operator
Check condition of silicone seal and inform the after-sales service if necessary	Yearly	Operator
Check door seal for tightness and inform the after-sales service if necessary	Monthly	Operator
Check the overtemperature protection function	Yearly	After-sales service
Check function of overpressure and vacuum valves	Yearly	After-sales service
Check the water draining quick-action coupling for tightness	Monthly	Operator

Table 3: Maintenance plan

5.2 Cleaning the testing chamber

Carefully observe any arising corrosion products and remove.

5.3 Checking the condition of the silicone seal

Visually check the circumferential silicone seal of the glass base of the testing chamber. Inform the after-sales service if it is found to be mechanically or chemically damaged.

5.4 Checking the door seal for tightness

Check the door seal for mechanical and chemical damage. Uniform contact pressure of the glass door must be ensured. If necessary, re-adjust the bracket (adjustable closure latch) to increase the contact pressure of the glass door.

5.5 Checking the performance of the vacuum valve

Diminished return flow in the drain-off channel below the testing chamber door indicates a clogged drain connection or vacuum valve.

5.6 Check the quick-action couplings for tightness

Check the connecting couplings (gas inlet/water drainage) that they are firmly seated in the case bushings. If necessary, carefully tighten the connecting couplings with a size 22 wrench.

6 Annex:

Survey of the pictographs

On (switch on or switched on)

Off (switch off or switched off)

Key lock operating panel

Key lock lid-drive

Test chamber open / close

Atomizing SAL

Ventilation

Ventilation off

KON bedewing

Timer

Heating test chamber KON

Heating test chamber SAL

Heating test chamber warm air

Heating humidifier SAL

Nozzle cleaning

Test chamber cleaning

Dosing pump test solution

Temperature limiter test chamber

Temperature limiter humidifier

Fault of dosing pump test solution

Fault of compressed air supply

Flooding test chamber

Low water test chamber

Unlimited

Pressure control

Pressure measuring

Compressed air operating condition

Humidifier SAL, general

Nozzle, general

Flow control

Fan test chamber

Illumination

Test solution, general

Test chamber emptying

Overflooding unit bottom

Filling, filling opening

Flooding humidifier

Low water humidifier

Fault air flow ventilation

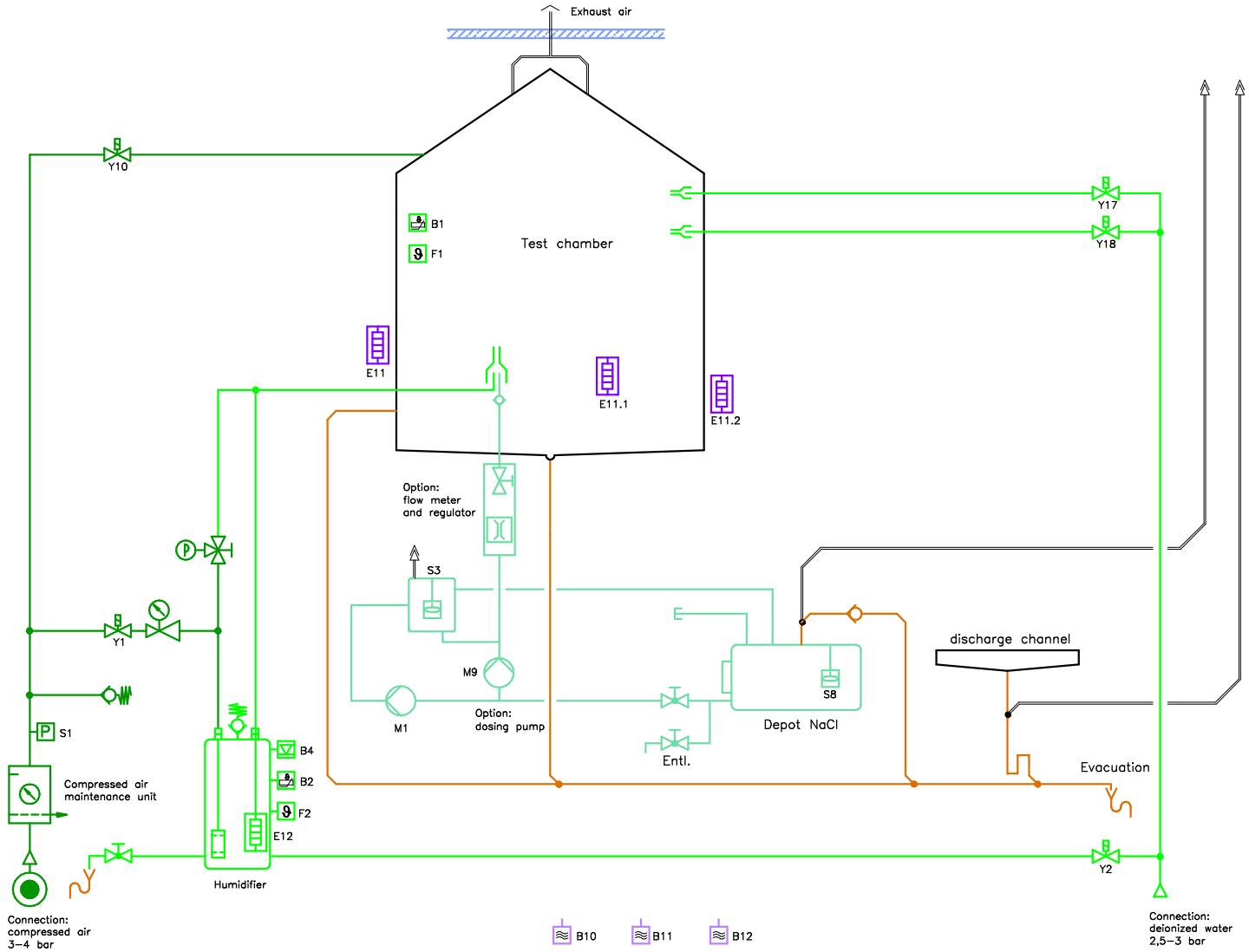
Annex: Spare parts list, M-SC

Designation	Description	Item No.
2/2-way valve, continuous input	Y1	1131 0022 1504
2/2-way valve, follower deionized water humidifier	Y2	1131 0022 1505
2/2-way valve, follower testing solution (secondary tank) (option)	Y15	1131 0011 1001
2/2-way valve, ventilation	Y10	1131 0022 1504
2/2-way valve, cleaning test.chamber demi.-water (option)	Y17	1131 0011 1003
2/2-way valve, cleaning samples (option)	Y18	1131 0011 1003
Heater grid, test.chamber (400 litres) back	E11	1131 0000 0030
Heater grid, test.chamber (1000 litres) back	E11.1	1131 0000 0020
Heater grid, test.chamber (2000 litres) back middle	E11	1131 0000 0050
Heater grid, test.chamber (400 litres) side left	E13.2	1131 0000 0030
Heater grid, test.chamber (1000/2000 litres) side left	E11	1131 0000 0015
Heater grid, test.chamber (2000 litres) back left	E12.1	1131 0000 0050
Heater grid, test.chamber (400 litres) side right	E13	1131 0000 0030
Heater grid, test.chamber (1000/2000 litres) side right	E11.2	1131 0000 0015
Heater grid, test.chamber (2000 litres) back right side	E13.1	1131 0000 0050
Heater - Humidifier	E12	1131 0000 0426
Power supply (30 W)	G1	1172 0000 0009
Mains filter	Z1	1171 0000 0012
Contactor - Safety circuit overtemperature	K1	1181 0000 0501
Additional contact for K1 (22DIL		1188 0000 0512
Semi-conductor relay-heating E11	K11	1182 0000 0713
Semi-conductor relay-heating E11.1	K12	1182 0000 0713
Semi-conductor relay-heating E11.2	K13	1182 0000 0713
Semi-conductor relay-heating E12	K12	1182 0000 0713
Level-control relay - Humidifier	N2	1181 0000 0547
Level-control relay - flooding unit bottom	N1	1181 0000 0548
Relay	K30-K70	1181 0000 0701
Compr. air monitoring		1141 0000 0302
Temp. controller Heater testing chamber SAL	P11	1151 0000 1112
Temp. controller - Humidifier	P12	1151 0000 1112
Switch-internal lighting (option)	S10	1111 0003 0050
Main switch (12A)	Q1	1111 0003 0011

Cycle counter	E2	
Timer - operating time	E3	
Timer - periodic working mode	E4	
Pilot lamp for overtemperature Testing chamber (red)	H1	1121 0001 0102
Pilot lamp for overtemperature Humidifier (red)	H2	1121 0001 0102
Pilot lamp - insufficient water humidifier (red)	H4	1121 0001 0102
Pilot lamp for overfilling humidifier (red)	H4.1	1121 0001 0102
Pilot lamp for fault of compr. air supply (red)	H5	1121 0001 0102
Pilot lamp for overflooding unit bottom (red)	H6	1121 0001 0102
Pilot lamp for fault of dosing pump (red)	H9	1121 0001 0102
Pilot lamp for testing solution storage empty (red)	H57	1121 0001 0251
Pilot lamp level control testing solution storage (yellow)	H57.1-H57.5	1121 0001 0151
Pilot lamp for heater Testing chamber (yellow)	H11	1121 0001 0101
Pilot lamp for heating humidifier (yellow)	H12	1121 0001 0101
Selector switch - Continuous/ fog evacuation	S20	1111 0003 0210
Lock - start duration of test	S50	
Safety switch - door testing chamber	B40	1141 0000 0501
Internal lighting (400/1000 litres)	E1	6133 0000 0001
Internal lighting (2000 litres) left, length of cable 2m	E1	6133 0000 0001
Internal lighting (2000 litres) right, length of cable 4m	E1.1	6133 0000 0002
Series device, left side (option)	L1	1172 0000 0100
Series device, right side	L1.1	1172 0000 0100
Test solution pump	M1	1132 0000 0103
Float switch- storage tank testing solution (NaCl)	S8	1141 0000 0403
Temp. sensor Testing chamber (PT-100)	B1	1142 0000 0013
Temp. sensor Humidifier (PT-100)	B2	1142 0000 0012
Filling-level probe-Level controller humidifier	B4	1142 0000 0302
Temperature limiter for testing chamber	F1	1181 0000 0121
Temperature limiter for humidifier	F2	1181 0002 0131
Humidifier tank SAL	101	1356 0000 0002
Draining valve Humidifier	102	1324 0026 0751
Non-return valve Humidifier		1324 0026 0601
Plug-in connector - Humidifier (grey)	103	1356 0000 9002
Plug-in connector - Humidifier (black)	104	1356 0000 9003
Screw union for grey	105	1356 0000 9011
Screw union for black	106	1356 0000 9012

Lid - Humidifier		6356 0000 9022
O-ring seal for lid - Humidifier		1356 0000 9014
Air-conducting pipe - Humidifier (long)		1356 0000 9009
Air-conducting pipe - Humidifier (short)		1356 0000 9010
Air distributor - Humidifier Filter		1211 0000 0401
Air distributor, complete with bracket		5214 0000 0001
Pressure gauge for compressed air SAL		1214 0000 0501
Pressure controller for compressed air SAL		1214 0000 0101
Overpressure valve		1324 0002 5001
Compressed air cleaning device		1100 0009
Changeover valve, advance pressure, for nozzle - Humidifier		1214 0000 0103
2-substance nozzle		1484 0022 1313
Non-return valve for suction line		1494 0033 5006
Replacement for continuous flow test solution filter		1282 0002 0404
Continuous flow test solution filter, complete		5212 0000 0402
Flow measuring and control module (DMR)		1215 0000 0001
Needle valve of the flow measuring and control module		1282 0000 1009
Steering castors		1010 0000 0001
Connector for compressed air		1414 0023 0064
Plug-in nipple		1414 0037 0001
Measuring cylinder - Mist collector		1536 0000 1001
Glass door (400 litres)		1530 0000 0003
Glass door (1000 litres)		1530 0000 0004
Glass door (2000 litres)		1540 0000 0002
Hinges for glass door		1010 3000 0102
Seal for glass door (400 litres)		6452 0000 0007
Seal for glass door (1000 litres)		6452 0000 0009
Seal for glass door (2000 litres)		6452 0000 0010

Tab. 4 Spare parts list, M-SC



all dimension in mm		allowable deviation without tolerance DIN 7168 mittel	
compartment GGB			

	date	name
design	05.10.06	MD
ckeck.		
Norm		

d			
c			
b	Update niveau vessel	04.12.07	MD
a	Update part identification	01.10.07	MD
cond.	modification	date	name

Liebisch LABORTECHNIK

scale: without

material: –

item number: 4401 7101

denomination: Functional diagram S 1000 M–SC

drawing number: 8100 4401 7101

sheet number: 01 of 01

origin	substitute	replaced

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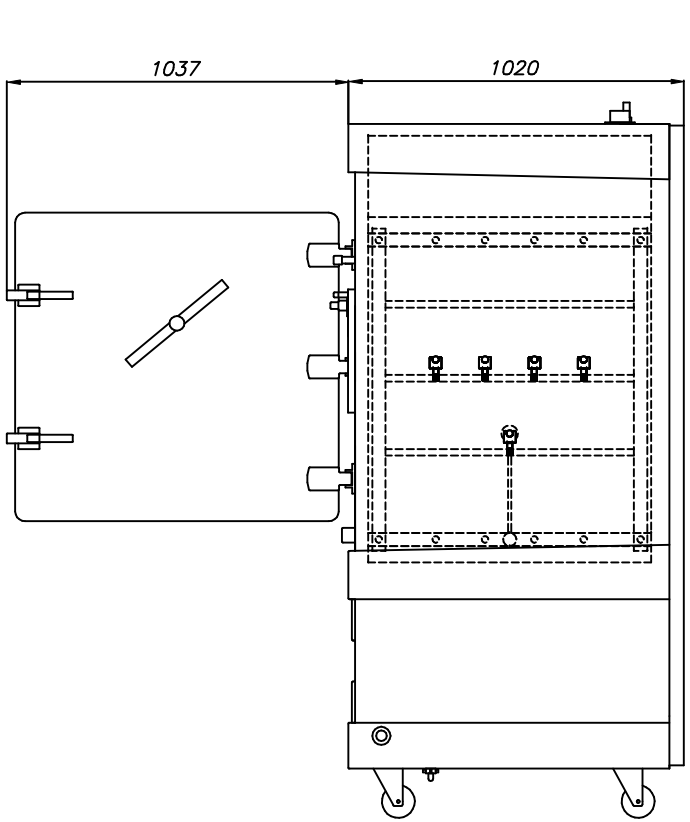

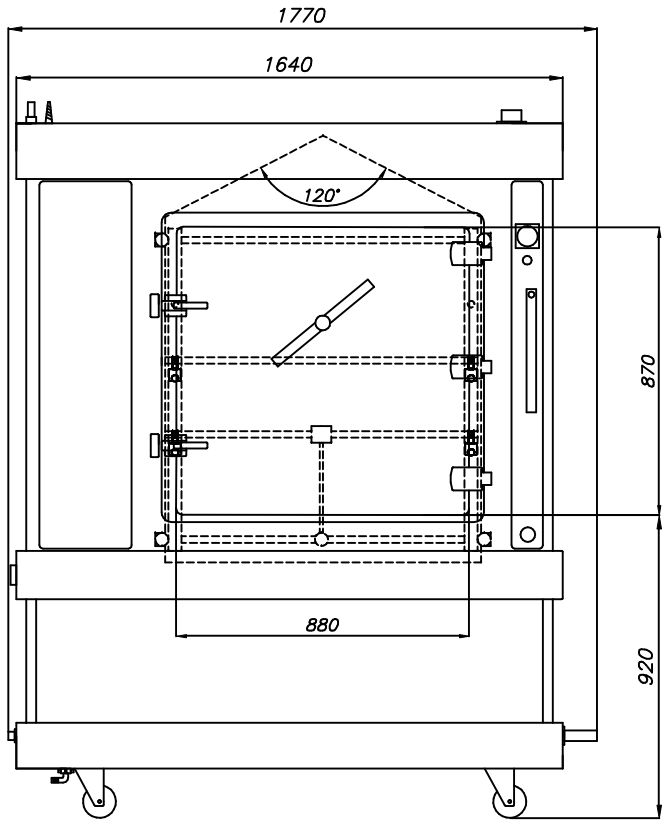

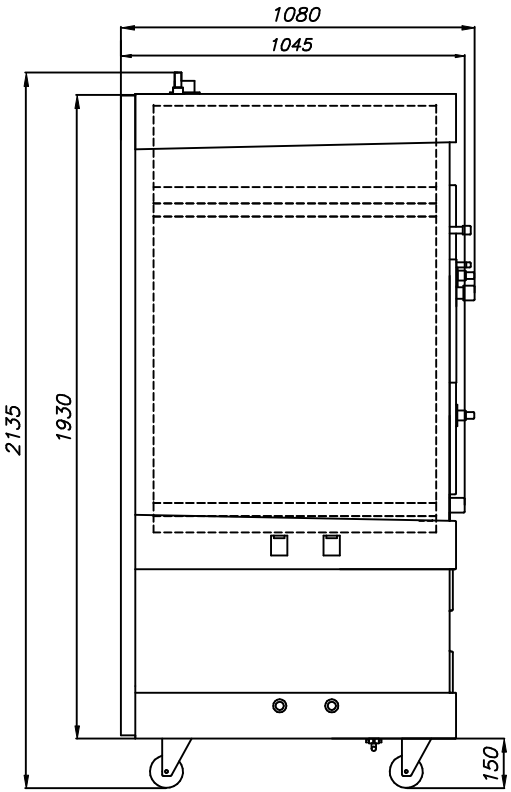

alle Maße in mm	Zulässige Abweichungen für Maße ohne Toleranzangabe nach: DIN 7168 mittel		Maßstab:: ohne
Abteilung: GGB		Bearb. 05.09.01 MD	Werkstoff:
		Gepr.	Art.–Nr.:
		Norm	

Zust.	Änderung	Datum	Name
d			
c			
b			
a			

Liebisch LABORTECHNIK

Benennung
Housing dimensions
SC 1000

Zeichnungsnummer/EDV–Nr. 8100 1000 0019

Blatt–Nr. 01 von 03

Ursprung | Ers. für | Ers. durch

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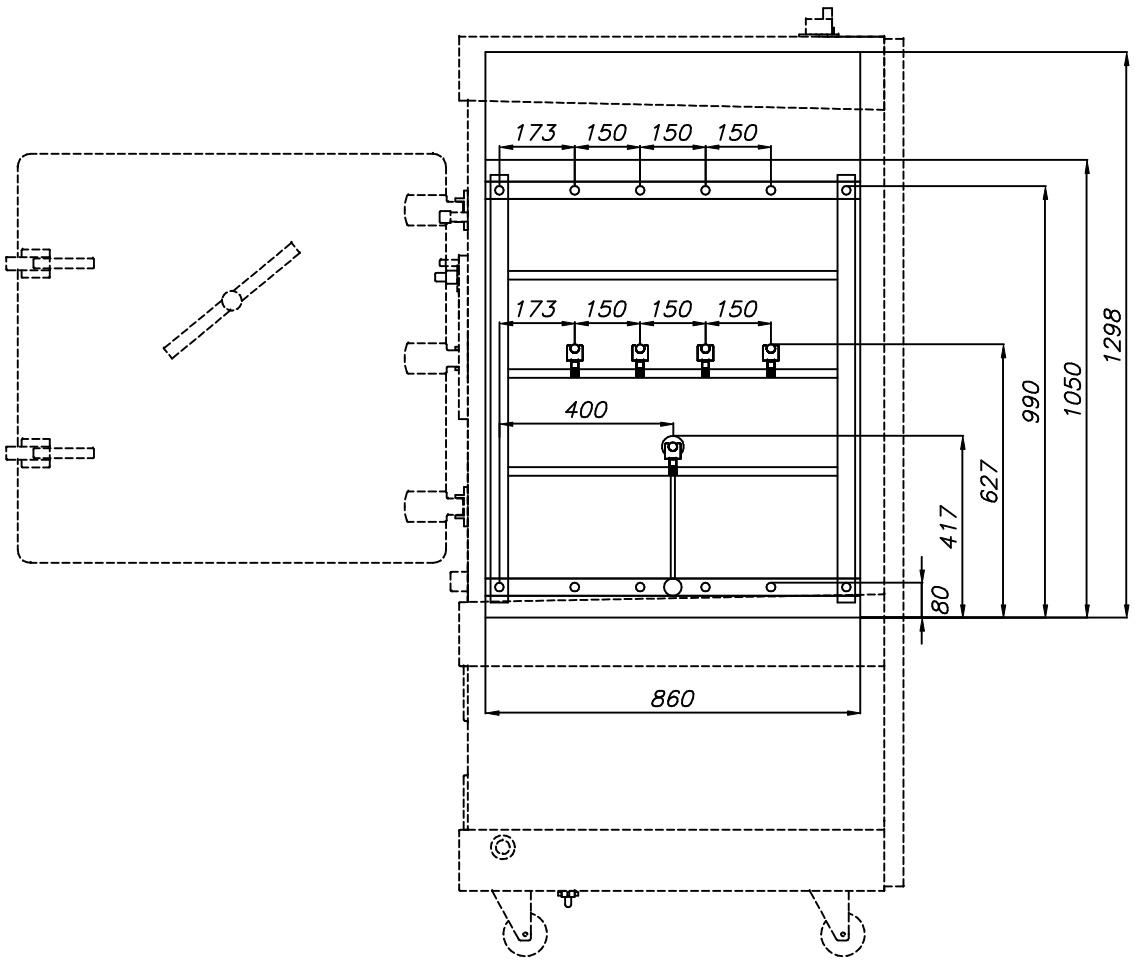

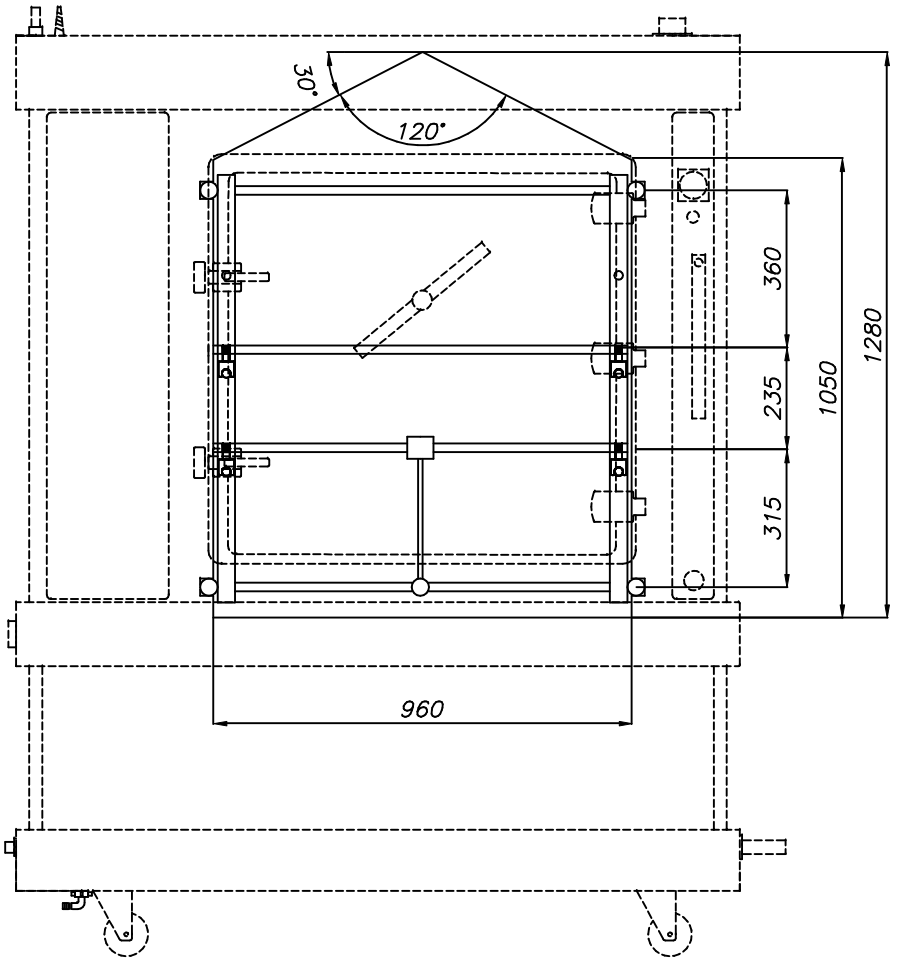

alle Maße in mm

Abteilung: GGB

Zulässige Abweichungen für Maße ohne Toleranzangabe nach: DIN 7168 mittel

	Datum	Name
Bearb.	05.09.01	MD
Gepr.		
Norm		

Maßstab:: ohne

Werkstoff:

Art.–Nr.:

Benennung

Test room dimensions
SC 1000

Zeichnungsnummer/EDV–Nr. 8100 1000 0019

Blatt–Nr. 02 von 03

Ursprung | Ers. für | Ers. durch

Zust.	Änderung	Datum	Name
d			
c			
b			
a			

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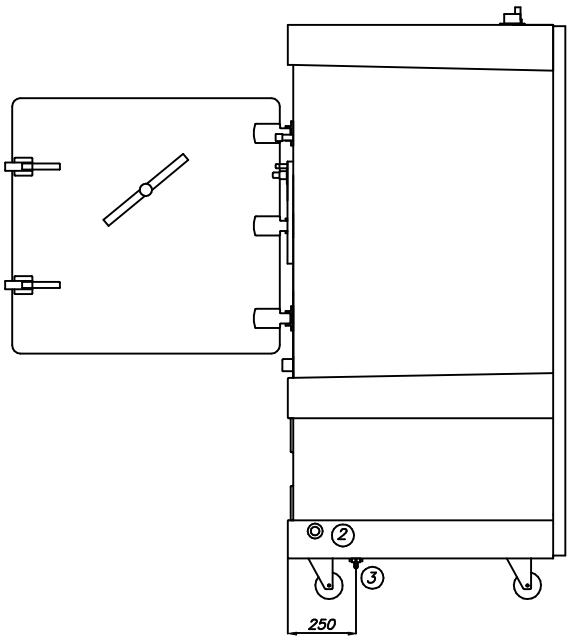

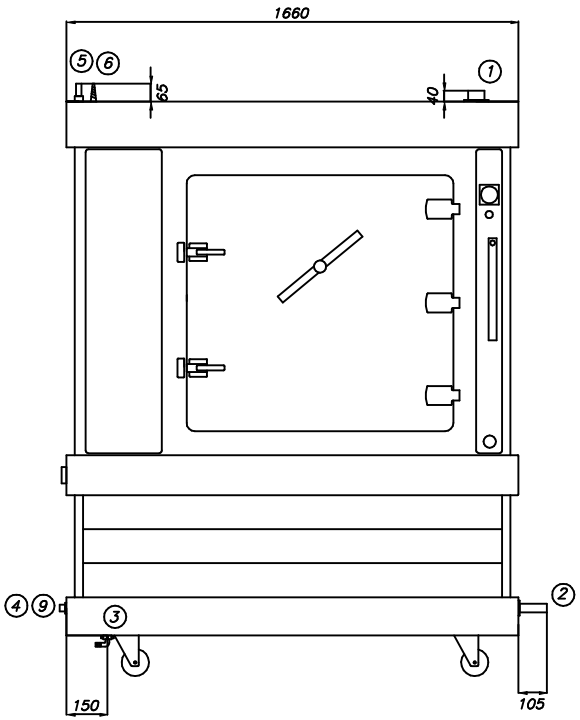

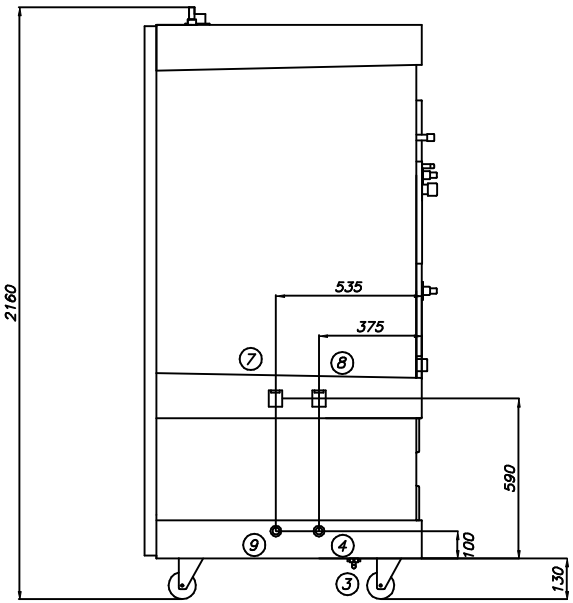

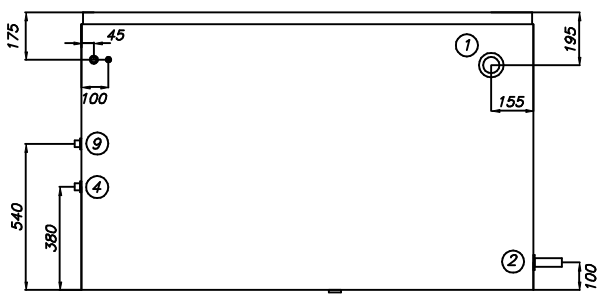

① *Exhaust-air connection (S=d50/ SKB=d75/ SKBW/SKBWF=d110) (suitable hose is included in supply)*

② *Condensate drain (S=d32/ SKB/SKBW/SKBWF=d63) (suitable hose is included in supply)*

③ *Connection evacuation NaCl-tank*

④ *Deionized water connection*

⑤ *Compressed air supply*

⑥ *Mains plug*

⑦ *NaCl socket*

⑧ *Deionized water socket*

⑨ *Connection additional NaCl supply (option)*

alle Maße in mm

Abteilung: GGB

Zulässige Abweichungen für Maße ohne Toleranzangabe nach: DIN 7168 mittel

	Datum	Name
Bearb.	05.09.01	MD
Gepr.		
Norm		

Maßstab:: ohne

Werkstoff:

Art.-Nr.:

Liebisch LABORTECHNIK

Zust.	Änderung	Datum	Name
d			
c			
b			
a			

Benennung

Connection dimensions SC1000

Zeichnungsnummer/EDV-Nr. 8100 1000 0019

Blatt-Nr. 03 von 03

Ursprung | Ers. für | Ers. durch

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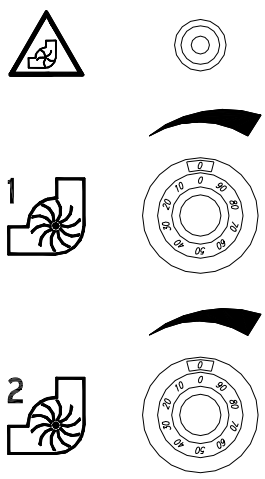
Annex: options

Dosing pump

The testing unit can be equipped with an optional dosing pump. The maximum volume of test solution is factory stored on 2 l/hr. The customer specific adjustment is to set by the potentiometric controller (1) on the control panel. The controlling is infinitely variable with a range of 0 to 2 l/hr. A full rotation of a controller changes the volume by 0,2 l/hr, every adjustment can be fixed.



Verdüsungsmenge Amount of atomization Quantité a diffuser	
Einstellung Adjustement Réglage	Liter/h Litre/h Litre/h
1	0,2
2	0,4
4	0,8
6	1,2
8	1,6
10	2,0

Figure Control panel (top) / dosing pump

For a new adjustment of a nozzle (for example after cleaning) it is possible, that the user had to set new values for the atomized amount of test solution. To check the values the user can control the flow measuring unit (if exists). We prefer to measure the collected volume of test solution, for example according to DIN EN ISO 9227: The collecting of a definite volume of test solution in graduated cylinders.

Testing chamber light

The fluorescent light on the back wall of the testing chamber can be switched on and off at any time (also during the actual test) with the interior light switch.

Glass door wiper

The wiper should only be used when the glass door is misted. The glass door wiper must only be turned clockwise.

Corrosion testing unit

Type

S 1000 M-SC

Drawings

Development plan

Circuit wiring diagram

Terminal assignment plan

Options (deposited in grey)

- ☐ After-run test solution
- ☐ Dosing pump test solution
- ☐ Test chamber flushing
- ☐ Mist nozzle flushing
- ☐ Recurrent working mode
- ☐ Interior lighting

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Zeichnung	8100 6150 1001		Abteilung: GGB
Projekt			
Blatt-Nr.	Bl. / Anz.	Bl. / gesamt	
1		1/22	

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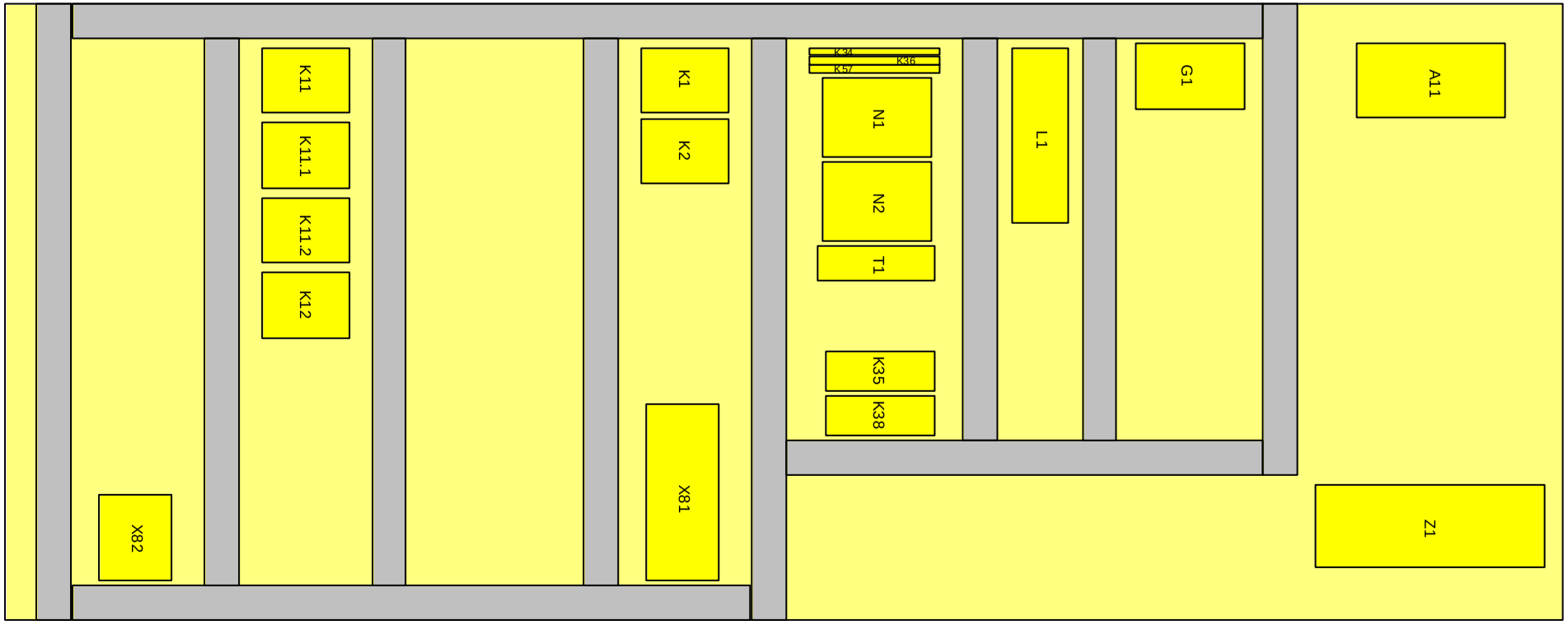
Following components exist only for corresponding equipment:
(deposited in grey)

-Interface relais K35 (Test room cleaning)
-Interface relais K36 (Circuit test solution)
-Interface relais K38 (Mist nozzle cleaning)
-Ballast L1 (Test room illumination)
-Measuring transmitter T1 (Dosing pump test solution)
-Converter A11 (Visualization)



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Zustand		Änderung				Blatt: Aufbauplan	Blatt-Nr.	Bl. / Anz. Bl. / gesamt	
Ursprung		Ers. für		Ers. durch			2	2/20 2/22	

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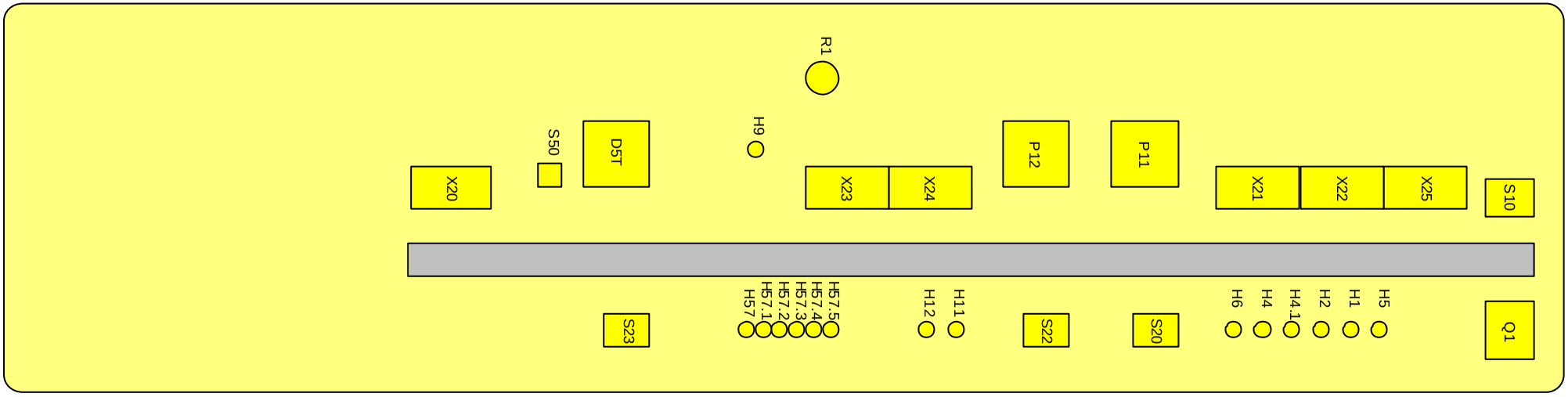
Following components exist only for corresponding option equipment:
(deposited in grey)

-Timer D5T (Duration of test)
-Key switch S50 (Duration of test)
-Control lamp H9 (Fault of dosing pump)
-Potentiometer R1 (Dosing pump test solution)
-Toggle switch S10 (Interior lighting)
-Toggle switch S22 (Recurrent/continuous atomization)
-Toggle switch S23 (Mist nozzle/test chamber flushing)
-Terminal strip X25 (Plug connector)



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Zchng. geändert	11.10.07	Bearb.	Pietig	geprüft			Projekt		
Zustand		Änderung				Blatt: Aufbauplan	Blatt-Nr.	Bl. / Anz. / Bl. / gesamt	
Ursprung		Ers. für		Ers. durch			3	3/20	3/22

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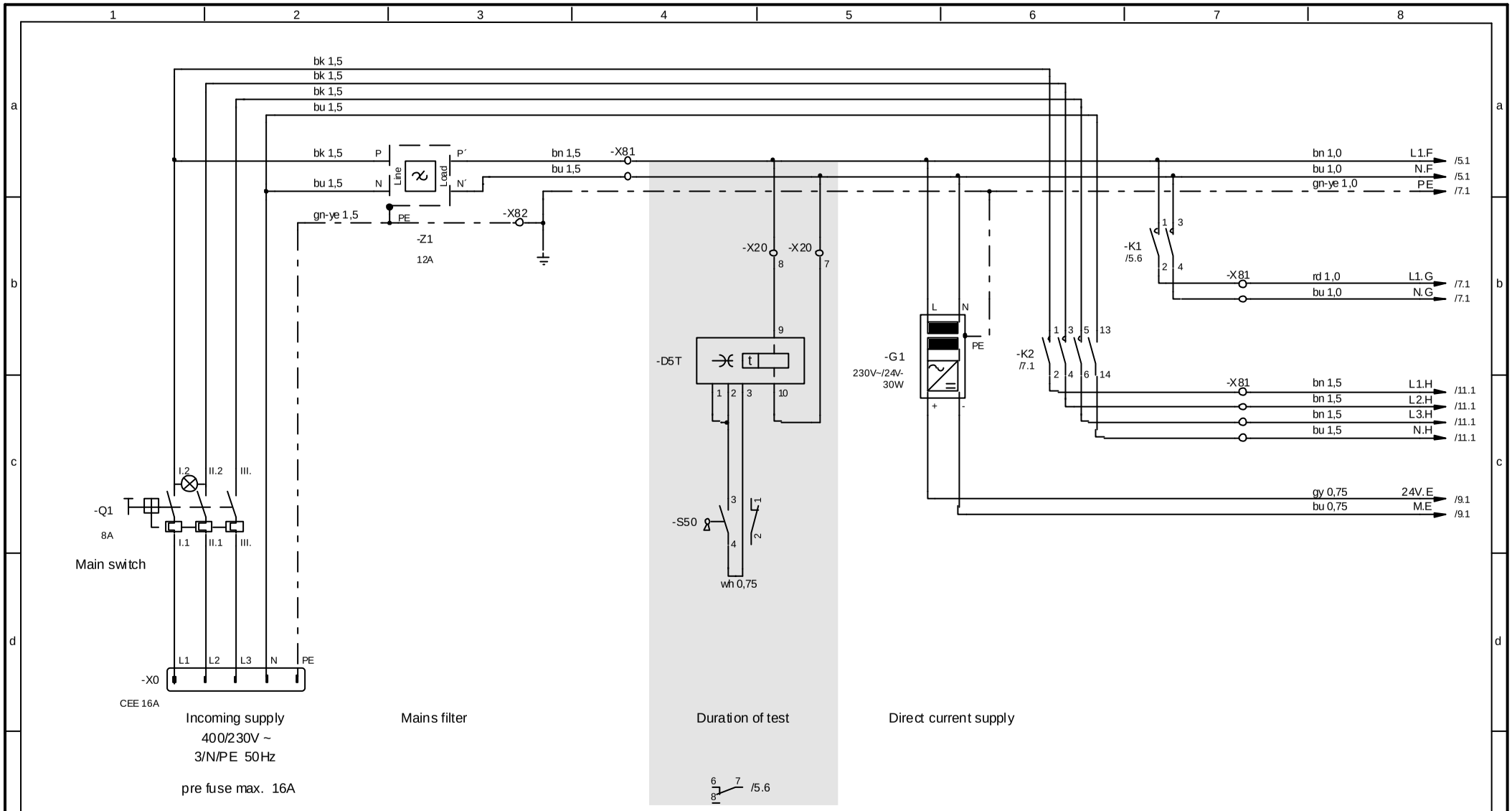

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Zchng. geändert	11.10.07	Bearb.	Pietig	geprüft				Projekt		
Zustand		Änderung					Blatt: Stromlaufplan	Blatt-Nr.	Bl. / Anz. / Bl. / gesamt	
Ursprung		Ers. für		Ers. durch				4	4/20	4/22

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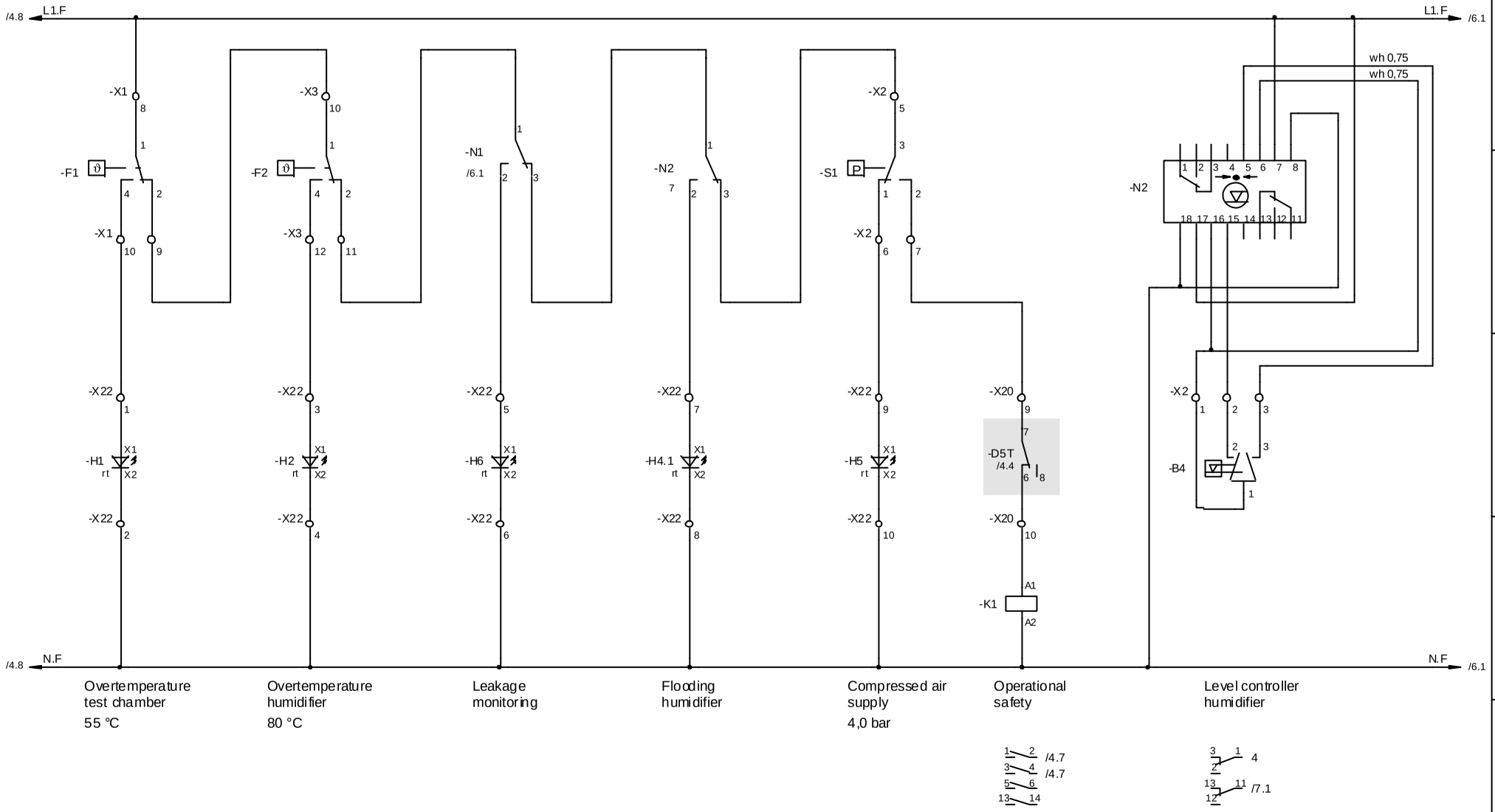

Zchng. erstellt	20.09.99	Name	Pi	Norm		Gerät: S 1000 M-SC	Zeichnung	8100 6150 1001	Abteilung: GGB
Zchng. geändert	11.10.07	Bearb.	Pietig	geprüft			Projekt		
Zustand		Änderung				Blatt: Stromlaufplan	Blatt-Nr.	Bl. / Anz. / Bl. / gesamt	
Ursprung		Ers. für		Ers. durch			5	5/20	5/22

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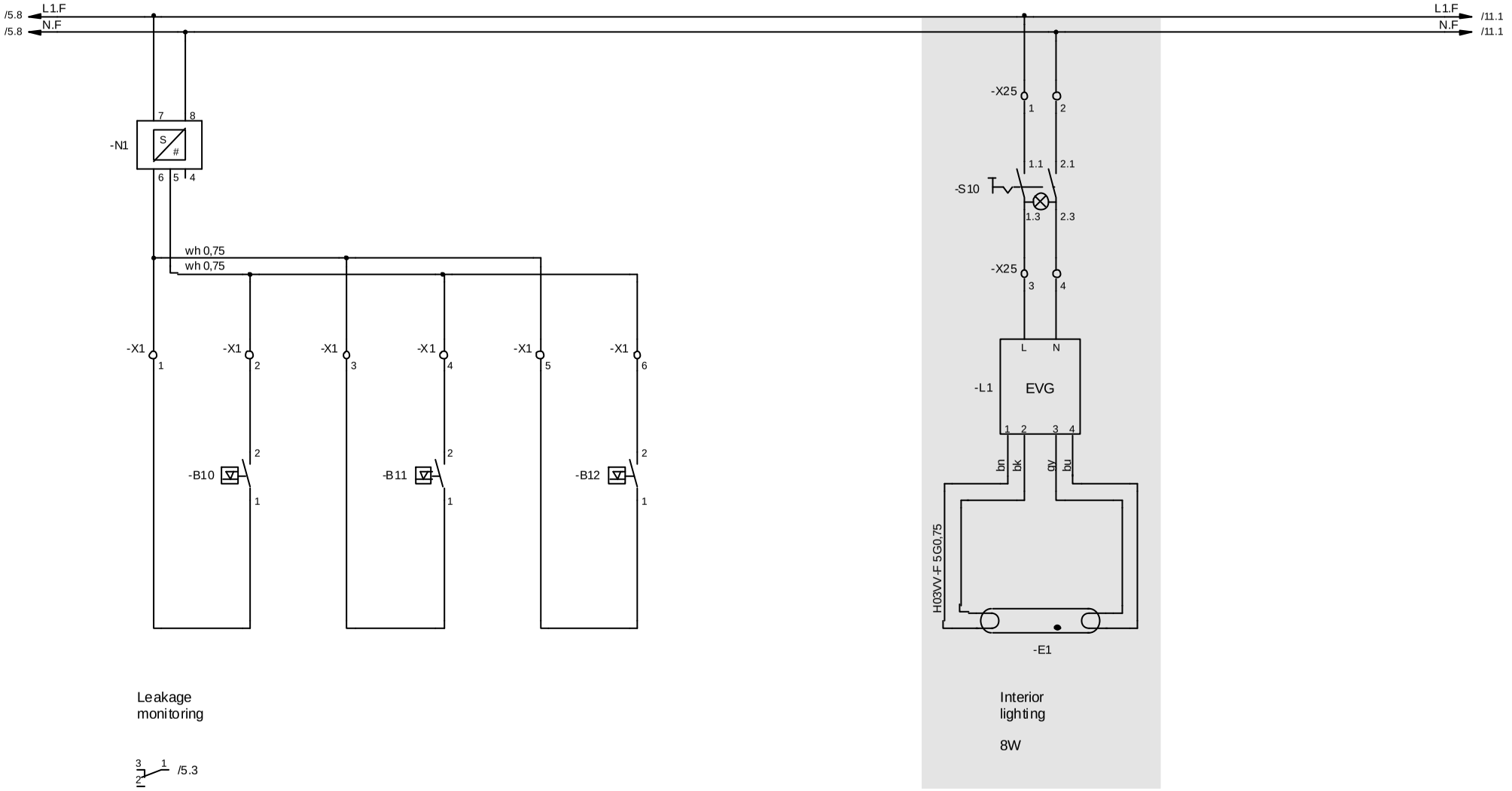

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Zchng. geändert	11.10.07	Bearb.	Pietig	geprüft			Projekt		
Zustand		Änderung				Blatt: Stromlaufplan	Blatt-Nr.	Bl. / Anz.	Bl. / gesamt
Ursprung		Ers. für		Ers. durch			6	6/20	6/22

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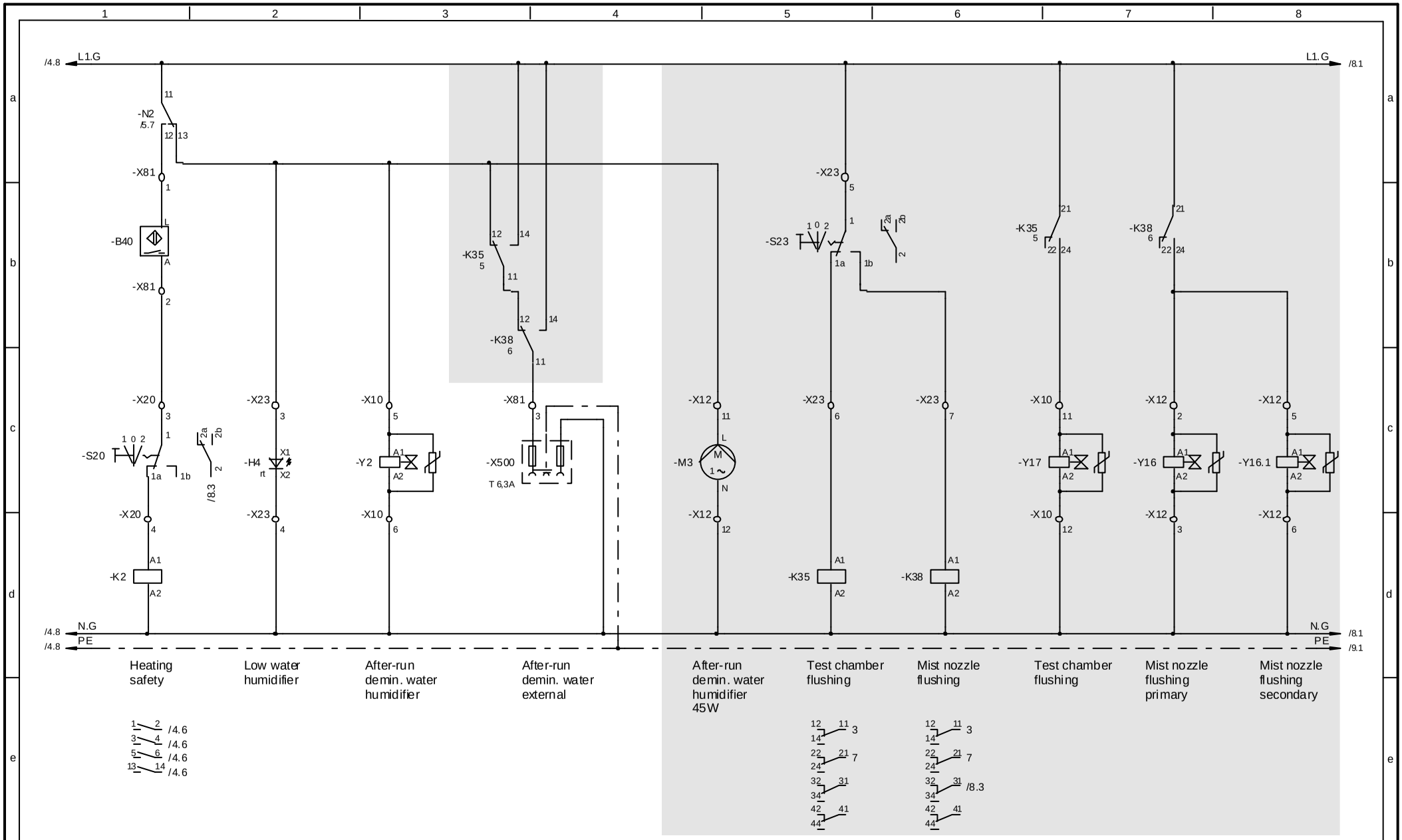

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Zchng. geändert	28.11.07	Bearb.	Pietig	geprüft	
Zustand		Änderung			
Ursprung		Ers. für		Ers. durch	

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Gerät:	S 1000 M-SC	Zeichnung	8100 6150 1001		Abteilung: GGB
		Projekt			
Blatt:	Stromlaufplan	Blatt-Nr.	Bl. / Anz.	Bl. / gesamt	
		7	7/20	7/22	

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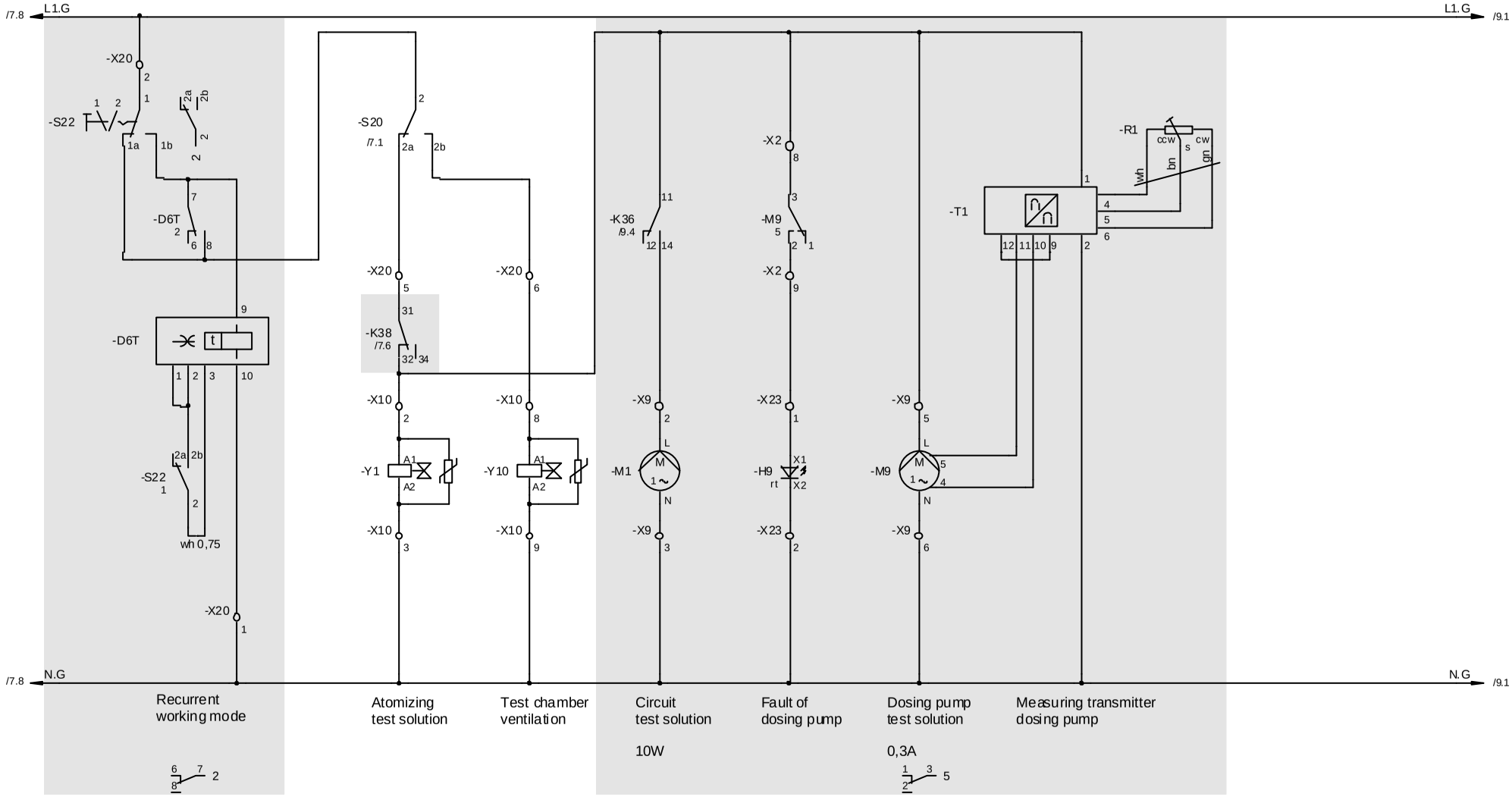

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Zchng. geändert	11.10.07	Bearb.	Pietig	geprüft			Projekt		
Zustand		Änderung				Blatt: Stromlaufplan	Blatt-Nr.	Bl. / Anz.	Bl. / gesamt
Ursprung		Ers. für		Ers. durch			8	8/20	8/22

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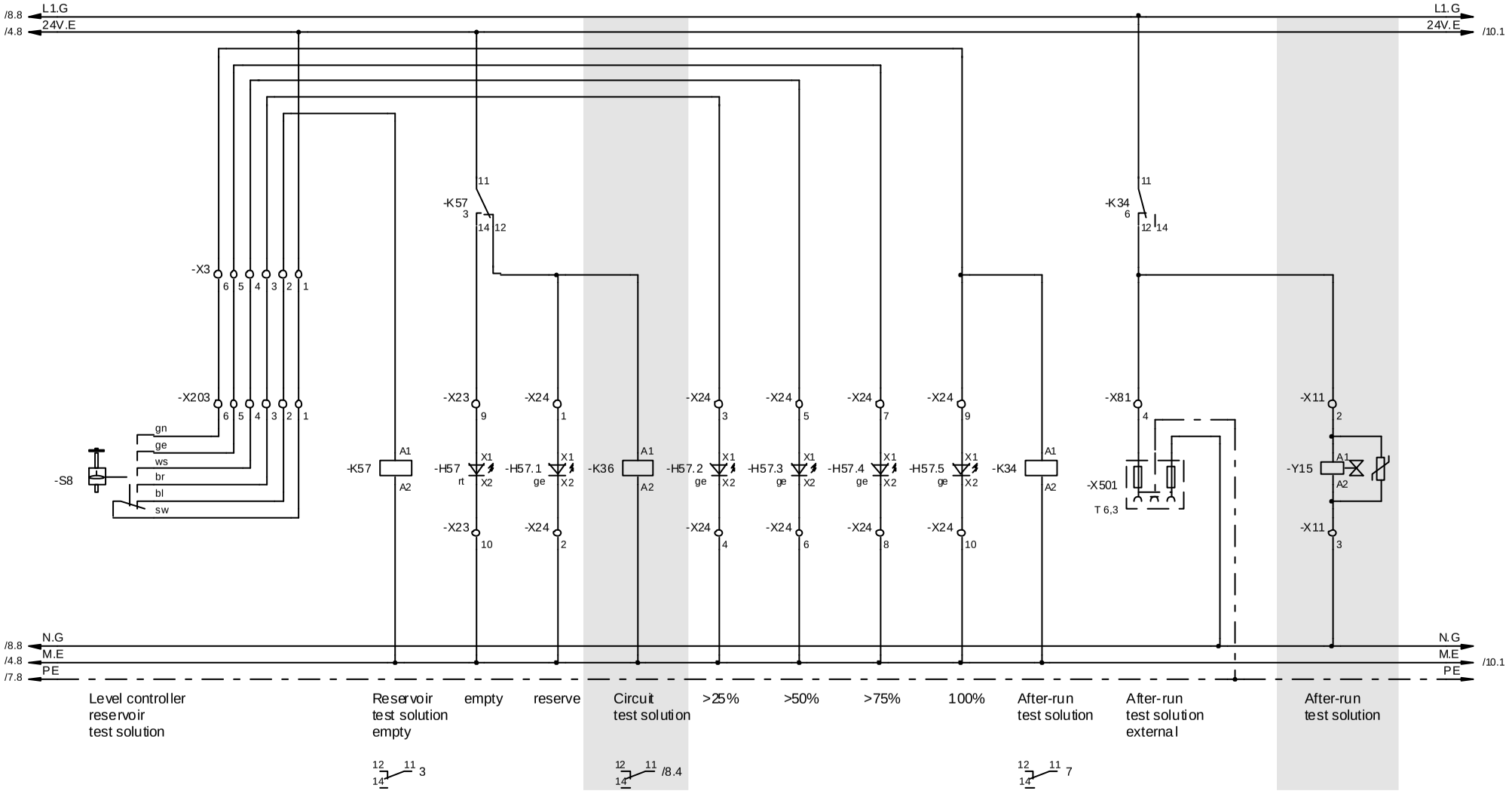

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Zchng. geändert	28.11.07	Bearb.	Pietig	geprüft			Projekt			
Zustand		Änderung				Blatt: Stromlaufplan	Blatt-Nr.	Bl. / Anz.	Bl. / gesamt	
Ursprung		Ers. für		Ers. durch			9	9/20	9/22	

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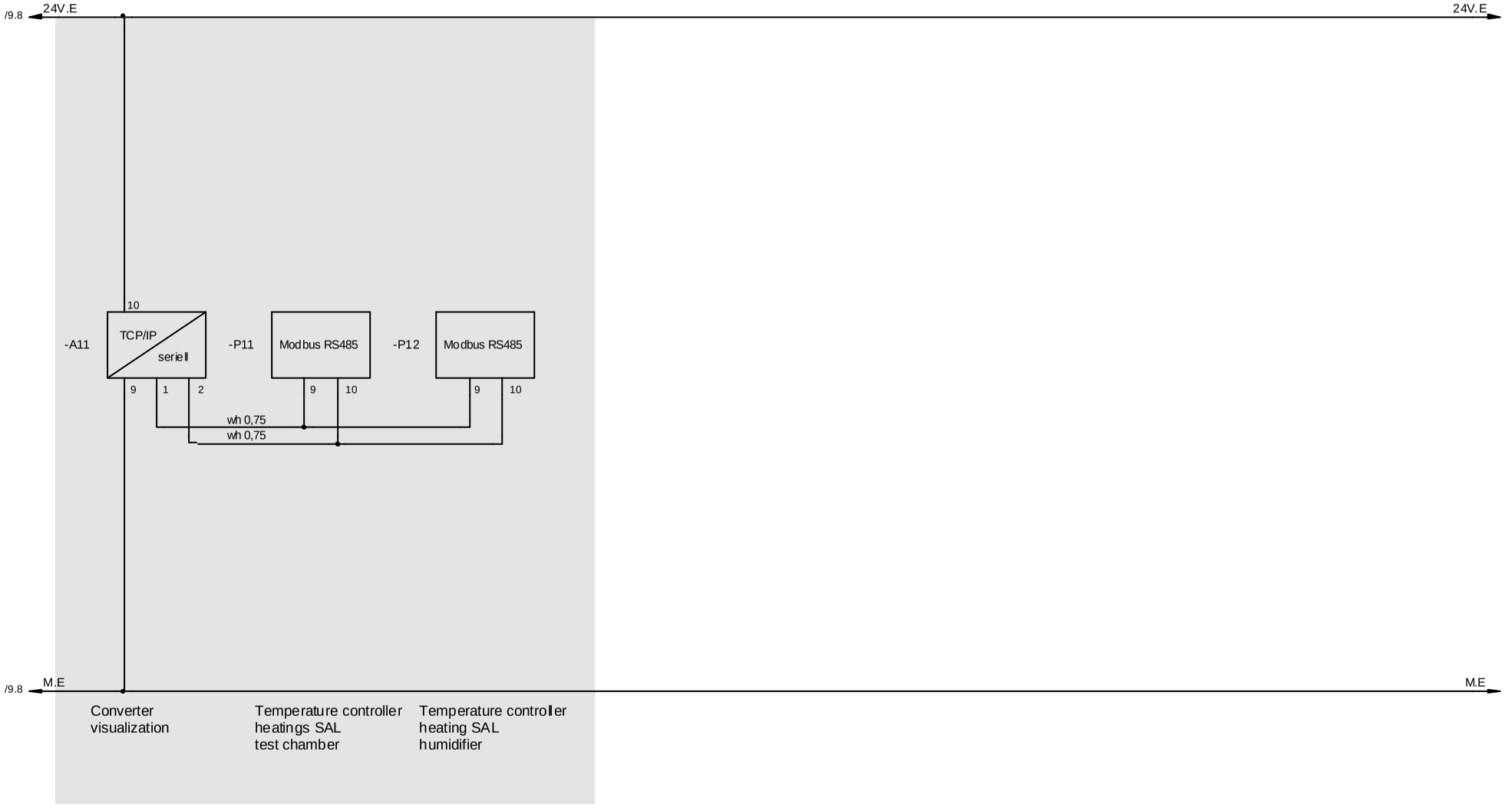

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Zchng. geändert	11.10.07	Bearb.	Pietig	geprüft			Projekt		
Zustand		Änderung				Blatt: Stromlaufplan	Blatt-Nr.	Bl. / Anz. / Bl. / gesamt	
Ursprung		Ers. für		Ers. durch			10	10/20	10/22

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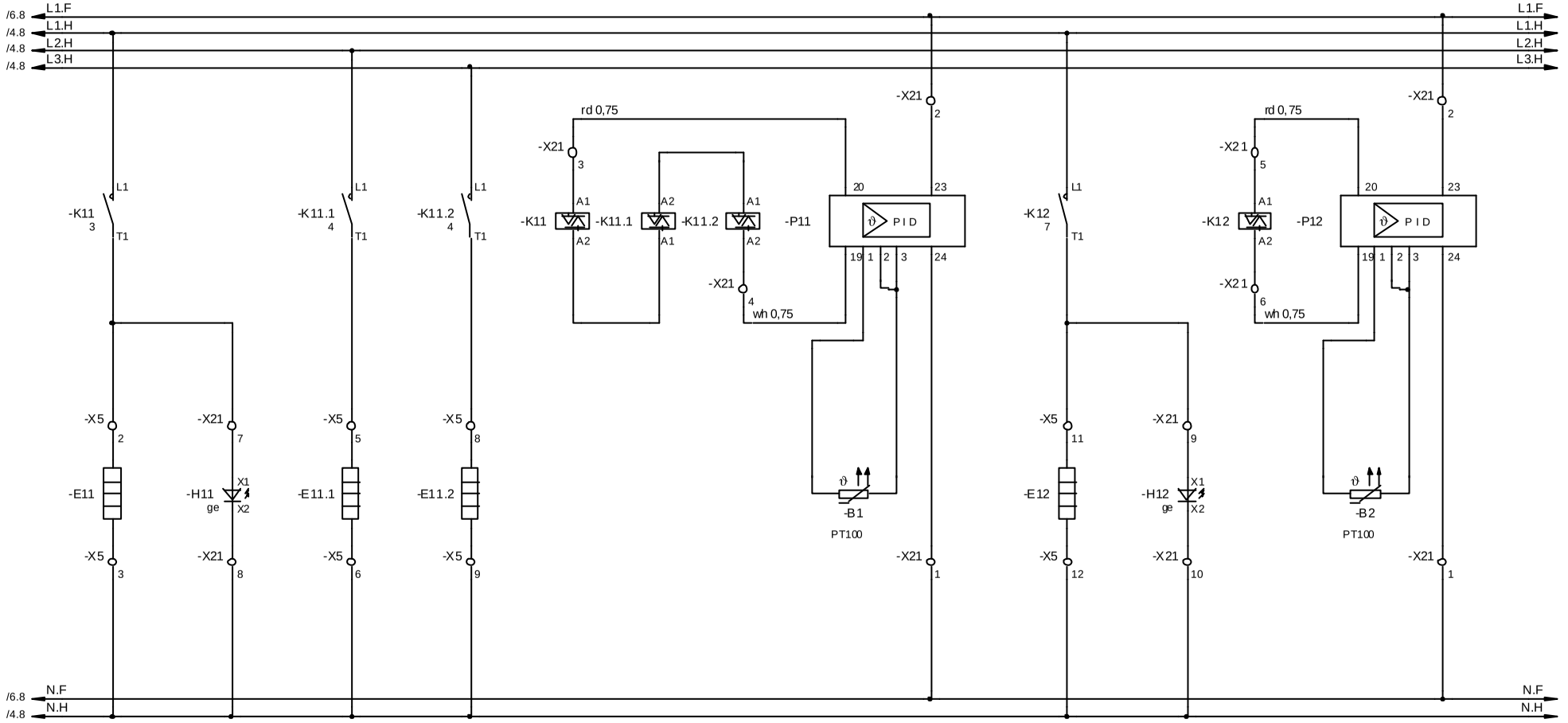

Zchng. erstellt	20.09.99	Name	Pi	Norm	
Zchng. geändert	11.10.07	Bearb.	Pietig	geprüft	
Zustand		Änderung			
Ursprung		Ers. für		Ers. durch	

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Gerät:	S 1000 M-SC	Zeichnung	8100 6150 1001		Abteilung: GGB
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		11	11/20	11/22	

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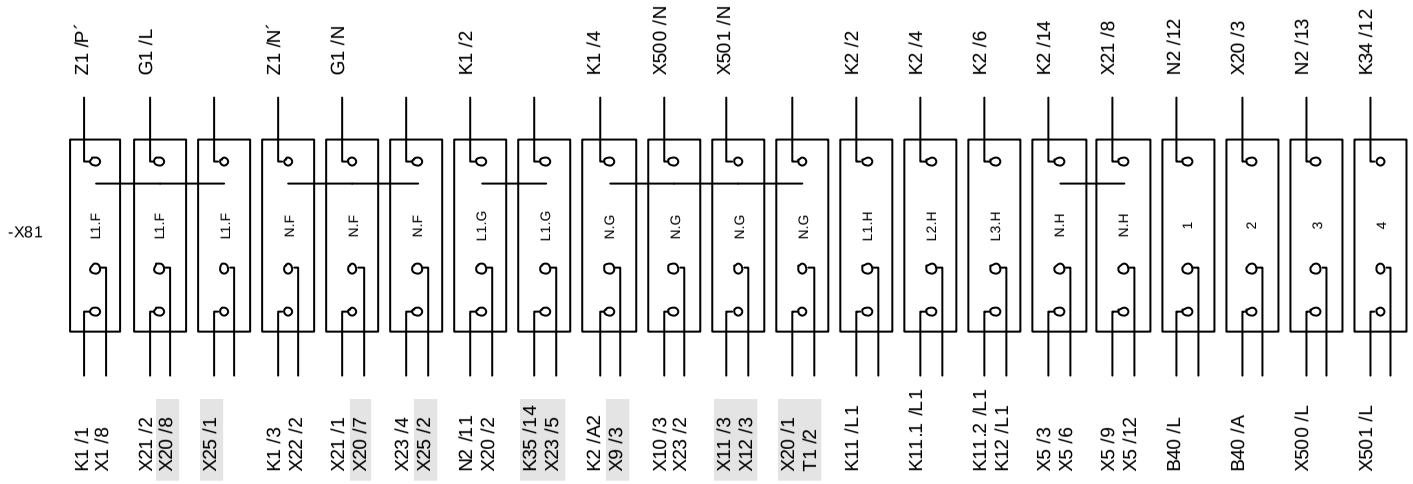

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Zustand		Änderung				Blatt: Klemmenplan	Blatt-Nr.	Bl. / Anz. / Bl. / gesamt	
Ursprung		Ers. für		Ers. durch			12	12/20 / 12/22	

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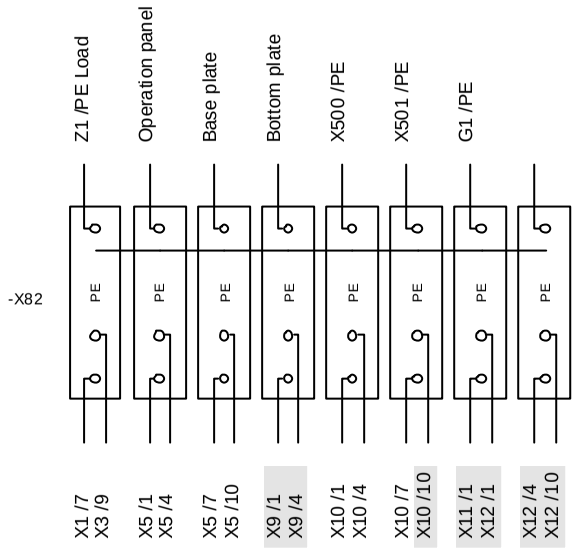

Zchng. erstellt	20.09.99	Name	Pi	Norm		Liebisch LABORTECHNIK	Gerät: S 1000 M-SC	Zeichnung	8100 6150 1001	Abteilung: GGB
Zchng. geändert	11.10.07	Bearb.	Pietig	geprüft				Projekt		
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Ursprung		Ers. für		Ers. durch				13	13/20 13/22	

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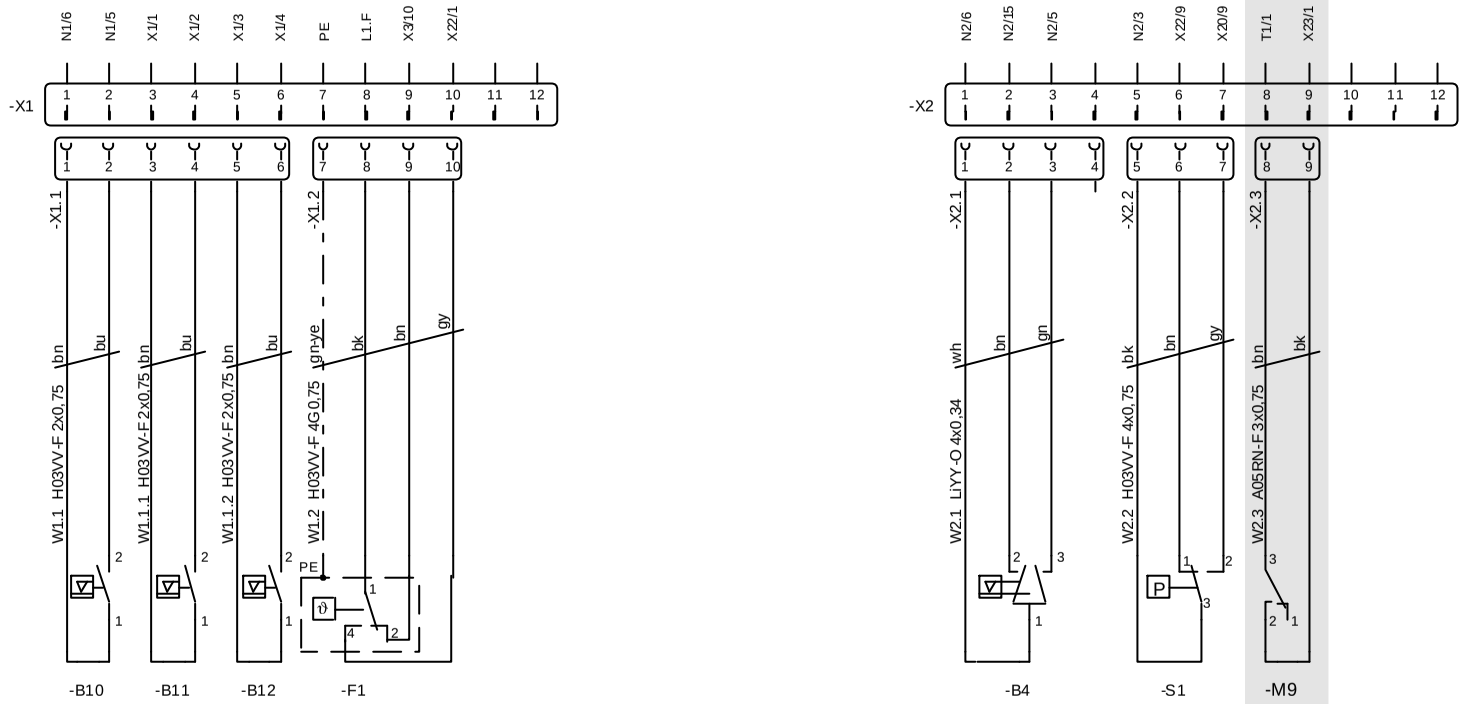

Leakage control

Excess temp. test chamber

55 °C

Level controller humidifier

Compr. air control

4,0 bar

Fault dosing pump

Zchng. erstellt	11.02.00	Name	Pi	Norm		Gerät: S 1000 M-SC	Zeichnung	8100 6150 1001	Abteilung: GGB
Zchng. geändert	11.10.07	Bearb.	Pietig	geprüft			Projekt		
Zustand		Änderung				Blatt: Klemmenplan	Blatt-Nr.	Bl. / Anz. / Bl. / gesamt	
Ursprung		Ers. für		Ers. durch			14	14/20	14/22

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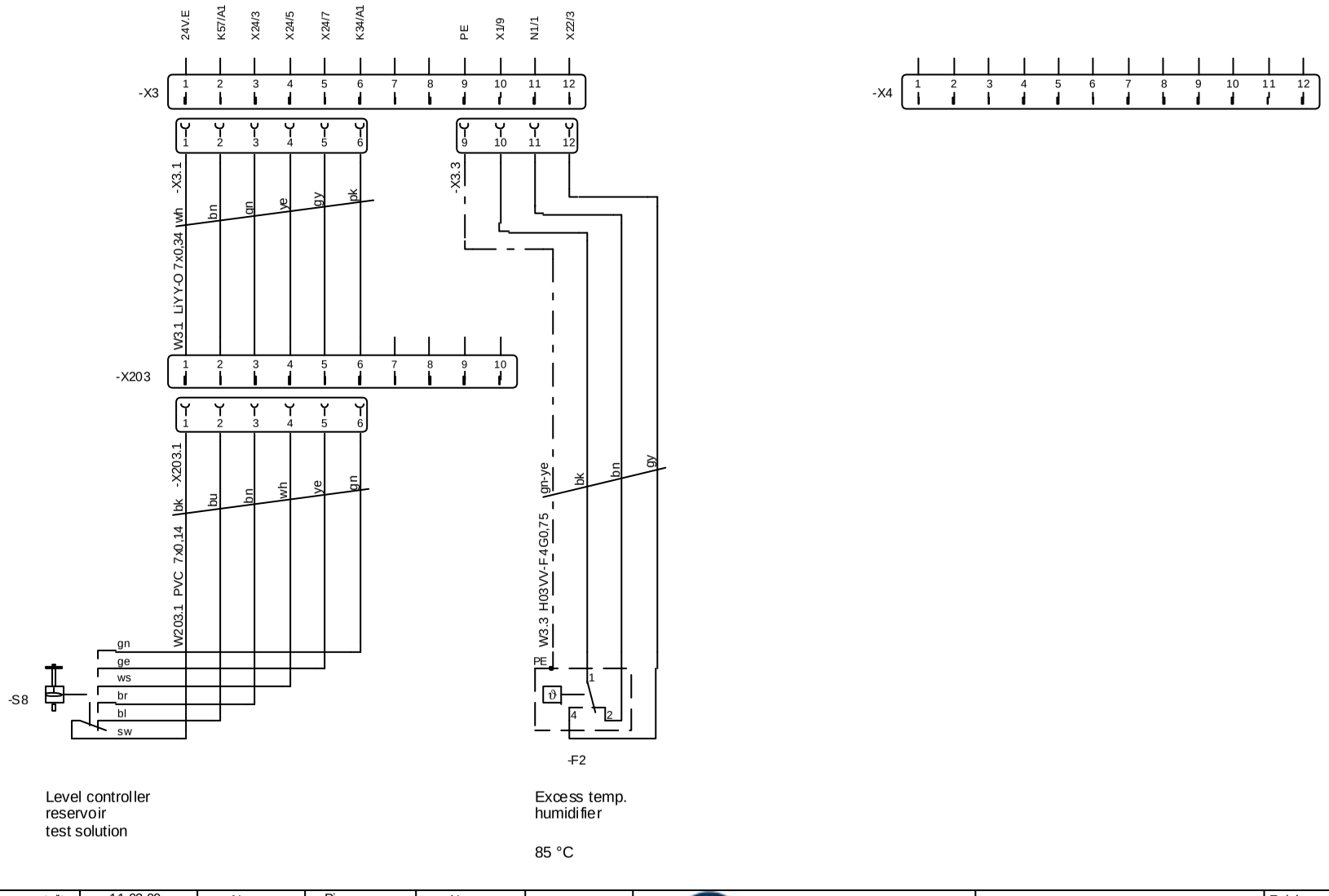

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Zchng. geändert	11.10.07	Bearb.	Pietig	geprüft				Projekt		
Zustand		Änderung					Blatt: Klemmenplan	Blatt-Nr.	Bl. / Anz. / Bl. / gesamt	
Ursprung		Ers. für		Ers. durch				15	15/20	15/22

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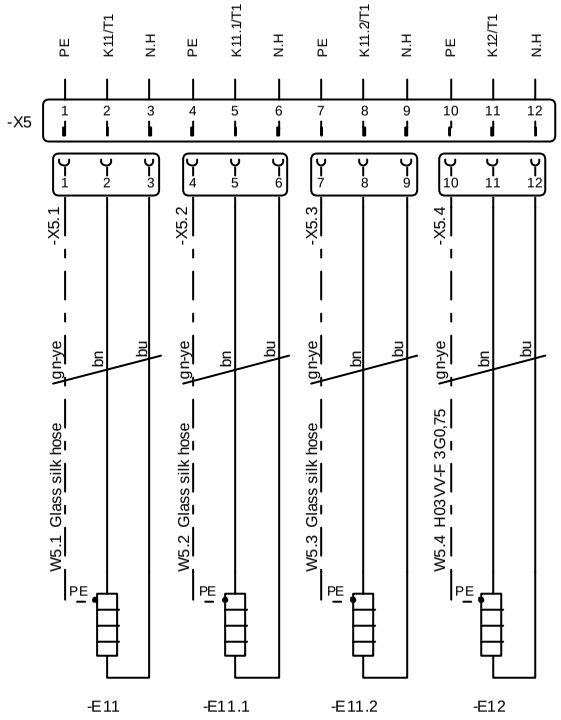

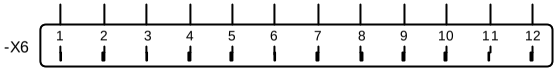

-E11	-E11.1	-E11.2	-E12
Heating SAL test chamber side wall left 0,7 kW	Heating SAL test chamber back wall 0,7 kW	Heating SAL test chamber side wall right 0,7 kW	Heating SAL humidifier 1,0 kW

Zchng. erstellt	11.02.00	Name	Pi	Norm	
Zchng. geändert	11.10.07	Bearb.	Pietig	geprüft	
Zustand		Änderung			
Ursprung		Ers. für		Ers. durch	

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Gerät:	S 1000 M-SC	Zeichnung	8100 6150 1001		Abteilung: GGB
		Projekt			
Blatt:	Klemmenplan	Blatt-Nr.	Bl. / Anz.	Bl. / gesamt	
		16	16/20	16/22	

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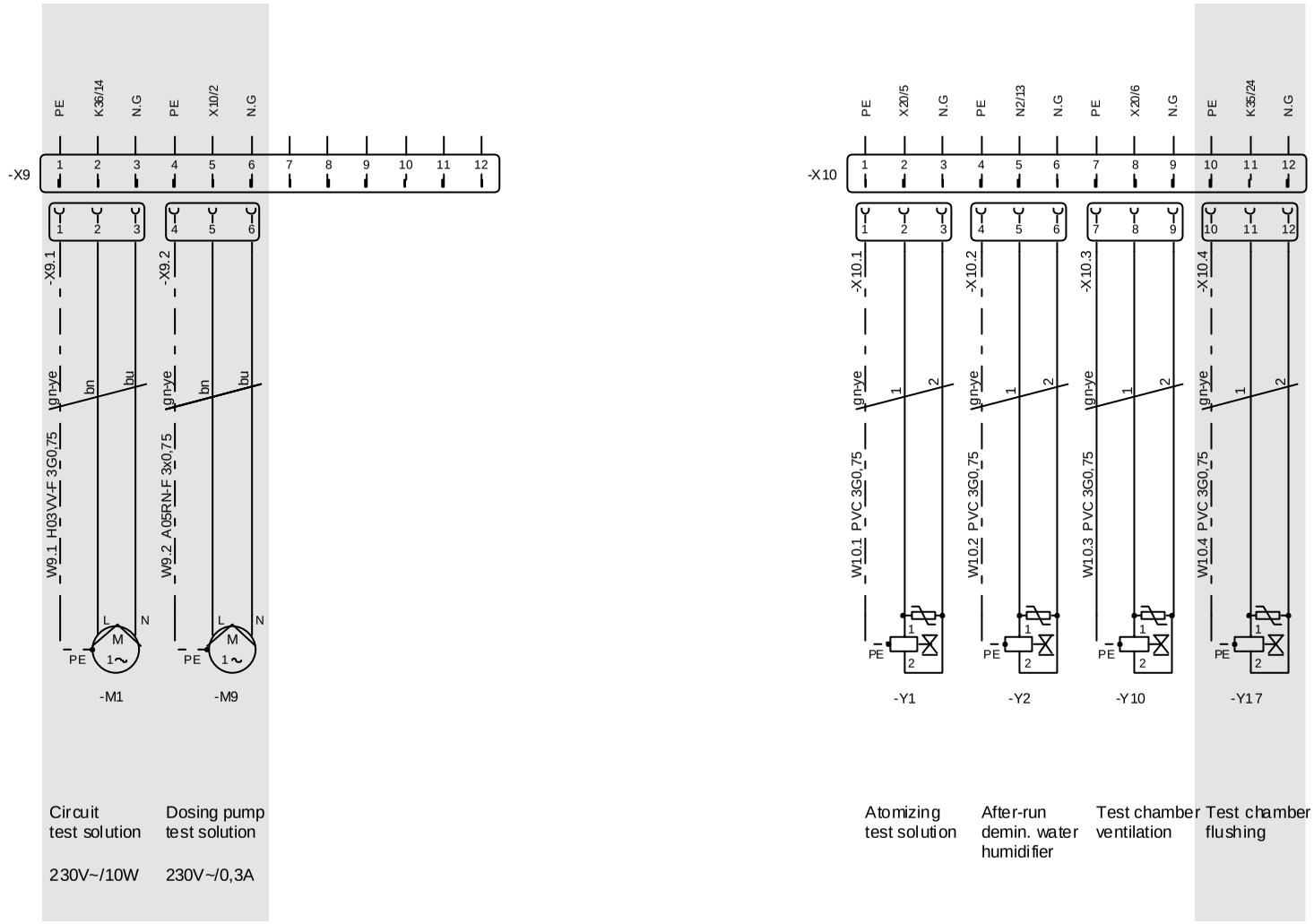

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Zustand		Änderung			
Ursprung		Ers. für		Ers. durch	

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Gerät:	S 1000 M-SC	Zeichnung	8100 6150 1001		Abteilung: GGB
		Projekt			
Blatt:	Klemmenplan	Blatt-Nr.	Bl. / Anz.	Bl. / gesamt	
		17	17/20	17/22	

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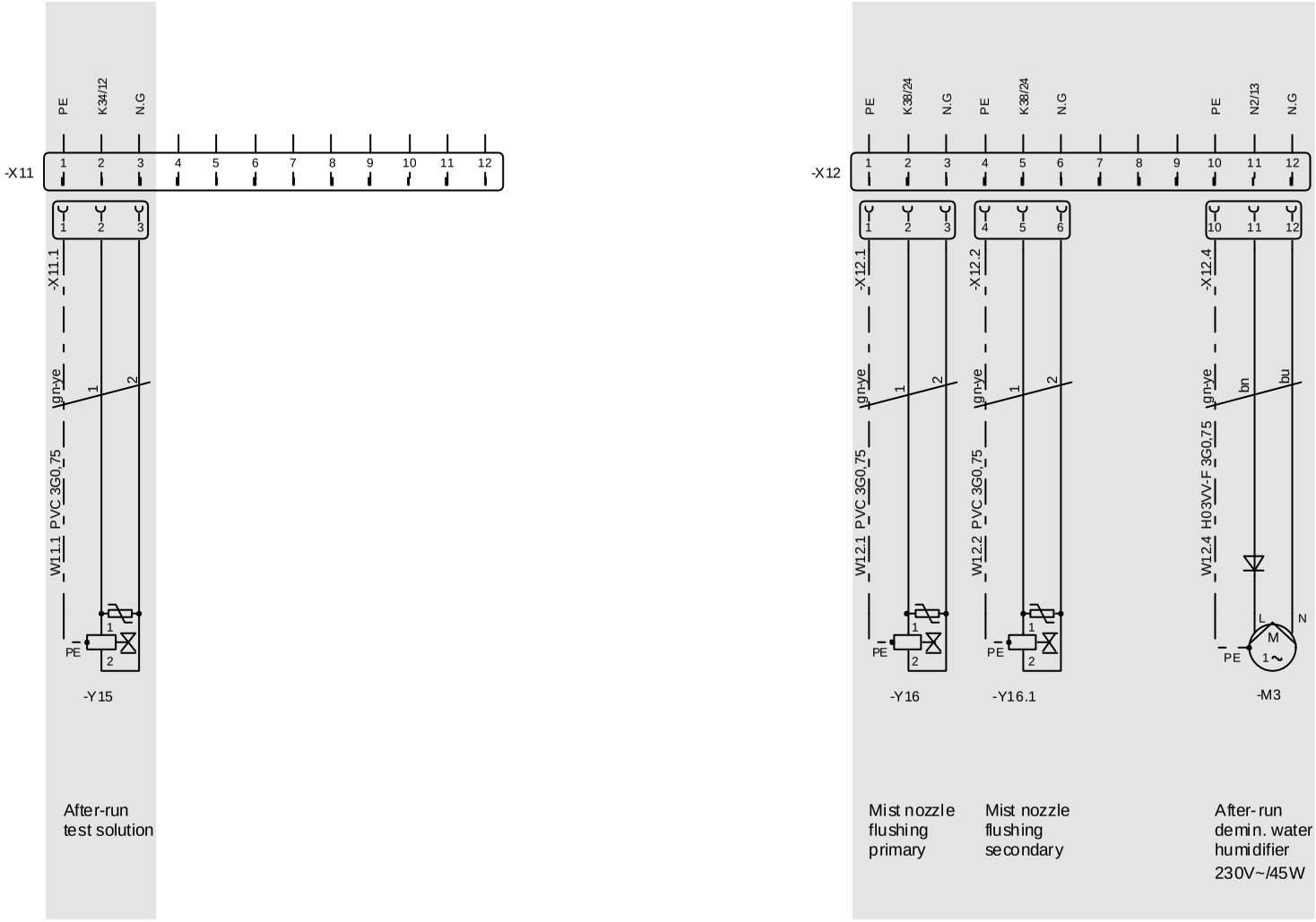

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Zchng. geändert	11.10.07	Bearb.	Pietig	geprüft			Projekt		
Zustand		Änderung				Blatt: Klemmenplan	Blatt-Nr.	Bl. / Anz. / Bl. / gesamt	
Ursprung		Ers. für		Ers. durch			18	18/20	18/22

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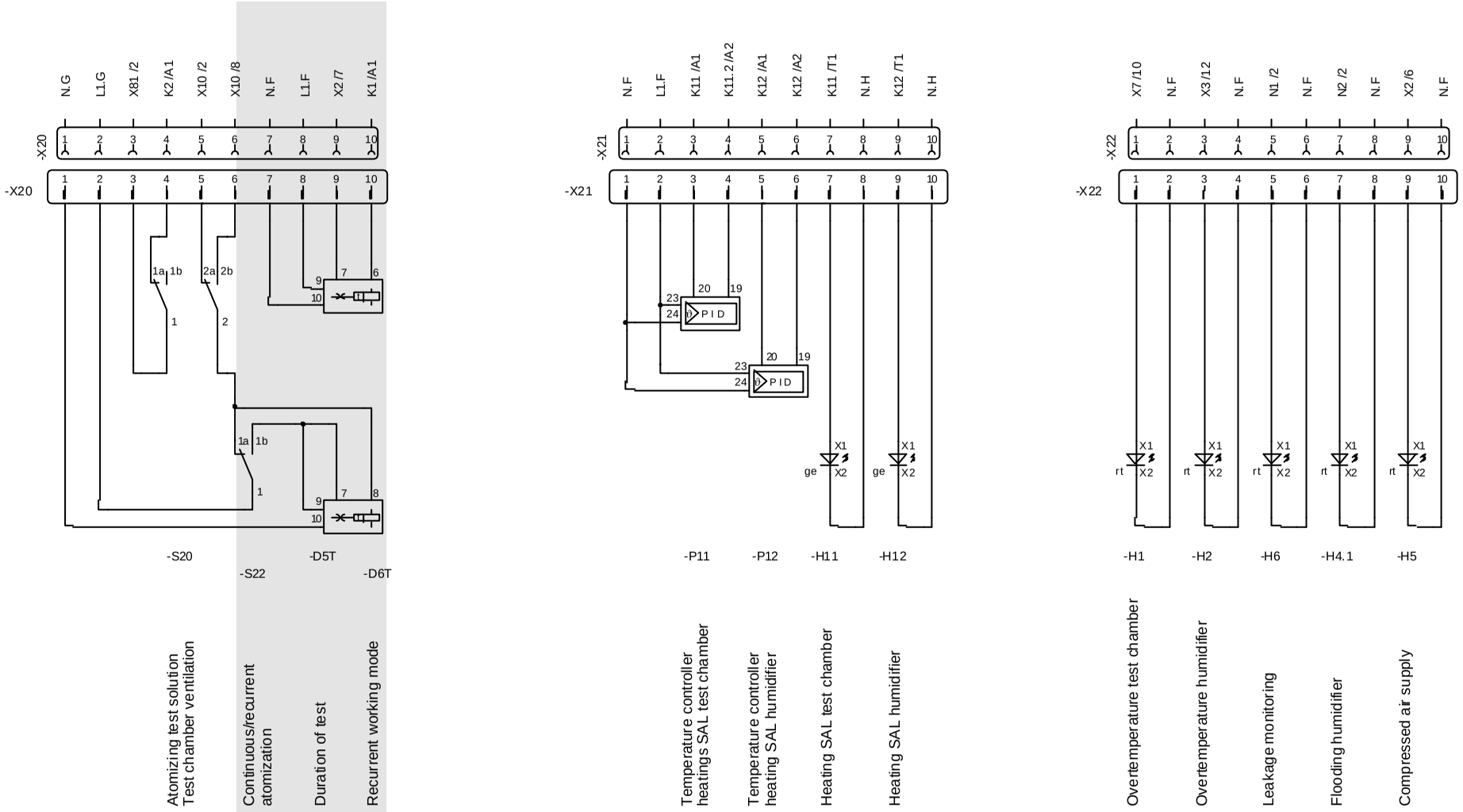

Zchng. erstellt	20.09.99	Name	Pi	Norm	
Zchng. geändert	11.10.07	Bearb.	Pietig	geprüft	
Zustand		Änderung			
Ursprung		Ers. für		Ers. durch	

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Gerät:	S 1000 M-SC	Zeichnung	8100 6150 1001		Abteilung: GGB
		Projekt			
Blatt:	Klemmenplan	Blatt-Nr.	Bl. / Anz.	Bl. / gesamt	
		19	19/20	19/22	

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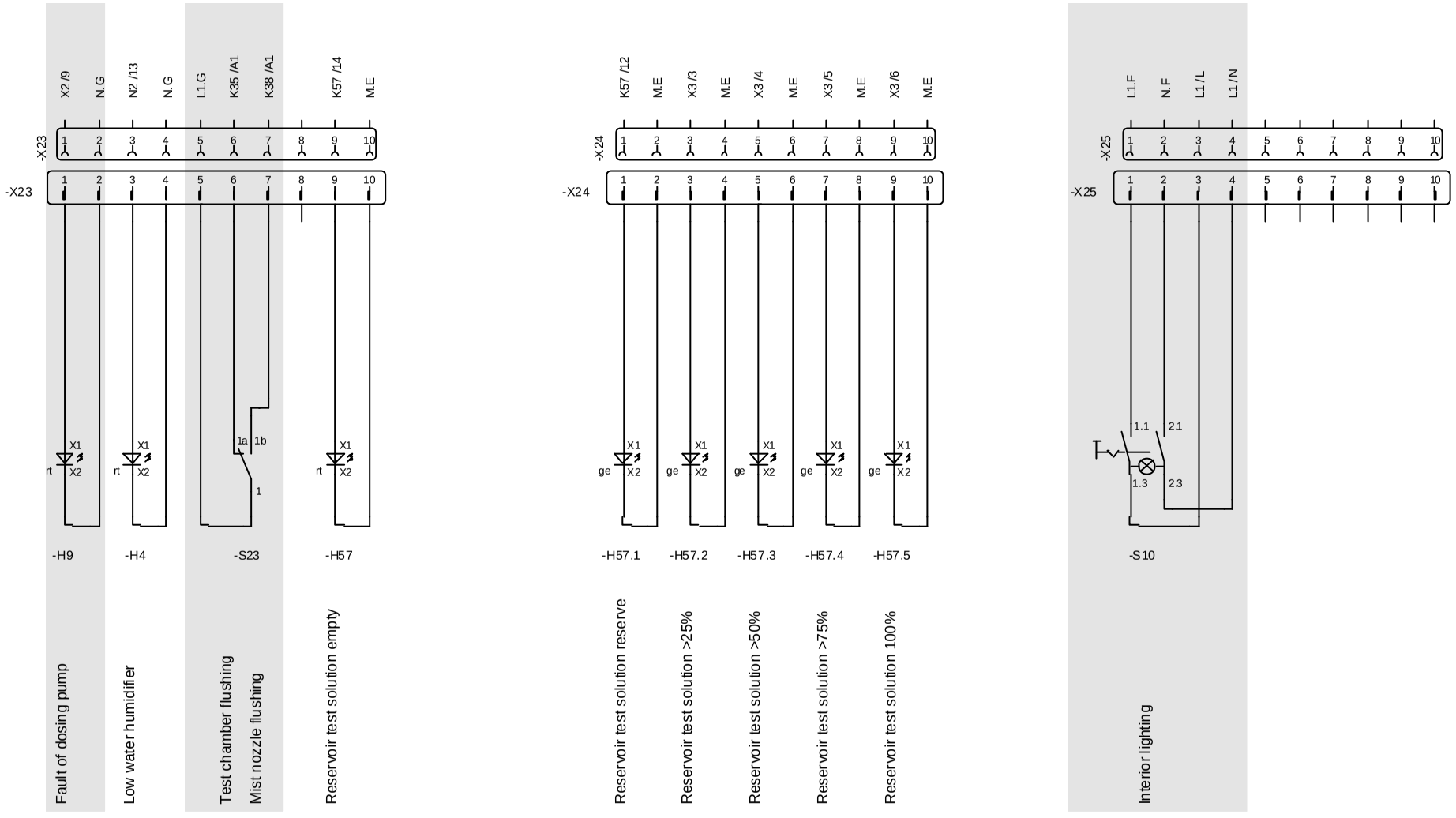

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Zustand		Änderung				Blatt: Klemmenplan	Blatt-Nr.	Bl. / Anz. / Bl. / gesamt	
Ursprung		Ers. für		Ers. durch			20	20/20 / 20/22	

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